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BOSTID-PARC RESEARCH PROGRAM

SITE VISIT REPORTS

September/October 1993

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FERTILITY GROUP MEETING

9-25-93

List of topics proposed at the meeting.

A. RESEARCH. There are two over arching themes, using either inorganic fertilizers or developing crop rotations, which include legumes, to increase soil fertility and crops yields of dryland cropping areas. Within each approach there will be a need to improve methods of measuring soil fertility conditions and relating them to crop response.

1. Application of modern research techniques in soil fertility research.
2. Development and improvement of soil tests and their calibration with crop response and use of foliar diagnostic techniques.
3. Study the feasibility of using foliar spray techniques to fertilize crops.
4. Quantify potassium and ammonium interactions with clay mineralogy to improve fertilizer management.
5. Develop legume rotation options for rainfed cropping conditions to provide nitrogen.
6. Quantify impacts of cropping systems on soil erosion and soil fertility.
7. Develop techniques to improve conditions on rangelands.

B. INFORMATION TRANSFER PROJECTS

1. Demonstrate the economic benefits of applying low rates of NPK fertilizers mixed with crop seeds.
2. Continue demonstration of the benefits to be obtained from using inorganic fertilizers on dryland cropping areas which rely solely on rain to provide water.

GENERAL COMMENT.

Although the researchers are sure that fertilization (either by application of inorganic fertilizer or fresh manure, or by crop rotation with legumes) of dryland crop areas would increase yields dramatically, they are also sure that farmers cannot afford the costs. Some way should be found to get beyond economics. I suggested giving the fertilizer to the farmers with an agreement to share the profits resulting from any increase in yield. Maybe one or more of the researchers could see a profit potential. It would be exciting to see if such a scheme would work. No doubt unusual controls, like supervising the application of the fertilizer and the harvesting, would be needed to safeguard the investment and obtain the profits.

Crop rotation with legumes, land application of fresh manure, and of inorganic fertilizer can increase crop yields of dryland agriculture. These increases may be more sustainable over the long run than yield increases obtained by irrigation. As Pakistan finishes developing its irrigation systems, improving production from dryland agriculture remains an untapped potential to increase food and fiber. It may also be the case that the cost/benefit ratio for improved crop yields from dryland will be smaller than for irrigated agriculture--rain water is cheap.

file name fostmtg--prepared by J. D. Oster

SITE VISIT REPORT

BOSTID PROJECT #3

September 28, 1993

Jim Oster

Title: Water-harvesting to enhance crop production in Highland Balochistan.

P.I. Mr. Z. Qureshi

1. Determine optimum water harvesting techniques for kushkhaba areas of highland Balochistan, appropriate to the local socio-economical and geohydrological conditions. Tests have started on strip cropping where strips of bare, smoothed soil for water harvesting alternate with crop strips. The width of both types of strips are the same, about two meters. The 1993-94 crop season will be the first year for strip cropping.

2. To establish catchment basin water harvesting demonstration areas on a wider scale.

3. To involve farmers in the use of water-harvesting as a technology for increasing crop yields.

   Discussions with the new director of ASRI and Quershi, the new PI, involved plans for expanding the projects to on-farm demonstration scales. The farming area has been selected but work on these two objectives likely will not begin before the 1994-95 cropping season. Several researchers at ASRI are convinced that on-farm demonstrations are an essential step to obtain farmer interest and adoption.

4. To determine the likelihood of the practice being adopted by farmers. The new PI and a resource economist on the staff have conducted one farmer survey already. The data has been summarized in a paper presented at a regional conference.

   Fifty percent of the farmers were interested in adopting water harvesting techniques. The principle constraints for adoption were lack of money and lack of confidence that risks of crop failure would be reduced. Labor was not perceived as limiting.

5. To measure the reduction in the risk of crop failure by the application of water harvesting practices. Mr. Zahid A. Qureshi has combined climatic data for the past fifty years with a water infiltration model (Phillips infiltration equation) to develop a crop yield model and has used the model to evaluate risk. These data have also been summarized in the paper referred to above.

6. To estimate the optimal area of water harvesting fields. I assume this means the ratio of the area of land used for water harvesting to the area of cropped lands. The research team has established that a ratio of 2:1 is not as good as 1:1. This conclusion is based on field data obtained over a period of seven years and on the crop model work of Mr. Qureshi.

file name lbost3

7. To determine the life-span of the run-off areas and techniques to extend the life-span of the run-off areas. Seven years of experience are available to make this assessment.

8. To determine the benefits to crop establishment and yields from better tillage and cultivation techniques for run-off water harvesting. No discussion about tillage trials and no field experiments were underway at the field site we visited.

9. To quantify the improvement in water use efficiencies obtained from better water harvesting treatments and from better agronomic practices. The strip trials referred to in Objective 1 above are believed to be an improvement. Field tests are beginning at the site we visited.

10. To establish salt-bush fodder reserves (Atriplex spp.) using spill over water from infiltration areas. Dean Anderson suggested cooperation with the animal scientists to characterize the palatability of the individual Atriplex plants. He pointed out that the genetic variation among plants is large and that palatability assessment would provide a method to increase the seed supply of those bushes that are moderately palatable. See Dean Anderson's report.

Problems: Vehicles. One vehicle has been in an accident and its loss has seriously impacted the ability of the field researchers to get to the outlying field sites. The engine, transmission and drive train are in good shape. It may be repairable for about $1000.00. Both Dean and I would support a request for special approval to have the vehicle repaired.

Papers: Anderson is taking the lead for reviews; there are several papers which the group would be able to have ready for the May meetings.

PI, USA travel: A letter to Judith Bale was written and mailed in the U. S. Anderson and I reviewed Qureshi's ideas and made several suggestions which were incorporated in the letter. Mr. Qureshi will also request from 2 to 3 days in Logan Utah to collaborate with Dr. Willardson on a paper that is in the final stages of being revised for publication in a peer-reviewed journal. Since this paper is related to the project, Anderson and I strongly support this portion of the planned itinerary.

file name lbost3

TO: Dr. Zahid Ali Qureshi

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale are the addresses for Pakistan companies who can help you with the repair of the balances, two schematics for the electric wiring of the two Sartorius balances, a style guide for the Journal of Arid Environments and the February 1993 trip report prepared by Dr. Bobby Stewart. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

I hope your proposed trip to the US in January comes to fruition. I have visited with Dr. Jerry Barrow (address same as mine) about your possible trip to the US and stop in Las Cruces. He thought that one day would be adequate to cover the work he is doing on *Atriplex* and that you would be most welcome.

I will be glad to make hotel arrangements for you while in Las Cruces if you let me know dates and times of arrival and departure. It is best to fly into El Paso Texas and take the ground shuttle bus from the airport to Las Cruces (currently $35.00 round trip). Currently the shuttle leaves El Paso 10 times each day between 6:30 AM and 11:30 PM. For reservations the telephone number is (505)525-1784 or 1-800-288-1784.

Thank you again for your hospitality during my recent visit to Quetta. Please give my best wishes to all the team especially Dr. Alvi.

Site Visit Report: 28 & 29, 1993

Project:
#3 - Water Harvesting to Enhance Crop Production in Highland Balochistan

Site Visitors:
Dean M. Anderson & Jim Oster (separate report submitted)

Current Status of the Research Project:
This project was jointly reviewed by Jim Oster and myself. I had not received a copy of Bobby Stewart's February 1993 site visit report. Enclosed is a copy of his report which was given to me by Jim. We discussed objectives of the project as they are currently being investigated by Dr. Qureshi. The point was made that barley, even though more drought tolerant, was grown in Balochistan mainly as a forage while wheat served as a dual resource both for human grain and straw for animals. Data is only being collected on straw and grain yields. The grain varieties used in the water harvesting trials are those suggested for use by the germ plasm group located at AZRI.

Atriplex was initially used at AZRI beginning in 1985 and has been incorporated into this project to utilize "extra" water that sometimes occurs when it rains. This *Atriplex* will serve as additional forage for the sheep and goats of the area. However, to date no work has focused on the various ploidy levels which appear to be related to preference by the browsing animal. However, rodents have presented a challenge in getting *Atriplex* established in the buffer zones associated with the water harvesting trials.

Following our discussion in the office we traveled (10:25 to 12:35 noon) to Mustung approximately 26 miles south of Quetta. With this study it appears that the 1:1 crop to water harvesting area is giving the best results. This is not what was reported earlier (see Additional information below). The water harvesting experiments look to be in good order. The *Atriplex* we were shown had a great deal of plant to plant variability in phenology and lushness. One particular selection was full of fruit that was lime green in color while the majority of fruit on other plants appeared brown and to be mature. We were told that the man who lived on the station browsed his animals (goats and sheep I believe) on these plants. There definitely was a noticeable difference in the amount of browsing among the various plants. This point was discussed among Zahid, Jim and myself.

Project Responsibilities:
Dr. Zahid Ali Qureshi assumed PI responsibilities on August 13 from Mr. Barber who served in R. Khan's absence between March and July 1993. No apparent changes in research thrust were observed since January 1993 and none were brought to my attention.

Problems:
In my opinion the change in PI's created some tensions among and between ceratin personnel involved in this project. However, after visiting with both Dr. Qureshi and Mr. Baber I believe they both want to see the best science come out of this project. Therefore, I commend them both for their positive attitude and high degree of professionalism being demonstrated as scientists.

What suggestions/recommendations did you make:

1) for next stage of project--action and time

We discussed the potential for interaction of Dr. Shahid Ahmad's team located at the Water Resources Research Institute at Islamabad to work with Dr. Zahid Ali. Evidently Dr. Ahmad has been in contact with AZRI since my January visit and it appears that cooperative work will be forthcoming. We encouraged Zahid that this cooperation appeared to us to be beneficial to all parties and most useful in solving the challenges of water harvesting in Balochistan.

Since the current research and that from a previous 6 year study indicate a difference in the "best" water harvesting approach (1:1 vs 2:1) I asked Zahid to make sure this was discussed in the proposed manuscript and he indicated it would be clarified.

Also the plant variability we observed at Mustung and its apparent affect on browsing needs further investigation especially since AZRI will be recommending the use of *Atriplex* in the "buffer zone areas" associated with the water catchments.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to the US each time for review.

Zahid plans to publish one paper in the Journal of Arid Environments. This paper will focus on 7 years of data on wheat and barley yield in response to climate on soil moisture. I was given a rough draft of a paper entitled Micro-catchment water harvesting: A technique to improve the soil moisture status in dry farming systems by Zahid Ali and L. S. Willandson. I read and commented on the manuscript. A second paper is planned on the modeling work which Zahid has been working on. This paper will be sent to an Elsevier publication which focuses on modeling, the exact title of the manuscript and journal were not discussed.

WEEK OF DECEMBER 12TH

Dean Anderson will receive a manuscript from Pakistan and based on the quality of its preparation it may be sent out for additional reviews (see time schedule, week of April 1). If the manuscript is judged to require a major revision it will not be sent out for further review at this time.

WEEK OF JANUARY 15TH

Dean Anderson will return manuscript with one or more reviews back to Pakistan with suggestions and corrections.*

WEEK OF MARCH 8TH

Dean Anderson will receive the revised manuscript. If the manuscript was not previously sent out it will be sent out to four reviewers at this time with the requirement that reviews must be back in Las Cruces before March 31.

WEEK OF APRIL 1ST

Dean Anderson will return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST

Authors will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

*If the pending trip to the US does occur in early January it would be possible for Dean to give Zahid comments when he visits Las Cruces.

Dean M Anderson's mailing address:
Box 30003, NMSU, Dept. 3JER
Jornada Experimental Range
Las Cruces, New Mexico 88003-0003
U.S.A.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of manuscripts to be presented at the May 1994 conference and a visit by the PI to the US during January 1994.

Other topics, if discussed:

U.S. Research Visits:
Zahid would like to visit the US during January 1994. I suggested that a stop in Las Cruces, NM to visit with Dr. Jerry Barrow concerning *Atriplex* would be appropriate since he would also like to visit research locations in Arizona and Texas. The details of this trip are not yet firmly fixed in Zahid's mind but he will consider spending one day with Dr. Barrow here in Las Cruces if this trip comes to fruition.

Consultant Visits:
None proposed

Equipment:
See items concerning balances under "Items to Send" below.

In addition, Zahid showed Jim and me a pickup which was in an accident and asked our opinion on getting it repaired. Jim and I felt that if the frame was not bent (we suggested Zahid can check this by simply pulling the vehicle and watch how it "tracks") and the person giving the bid will guarantee his work the $1,000.00 price quoted for repairs seemed very reasonable for a "field worthy" vehicle.

Payments/Financial:
None discussed

Items to Send:
Schematic diagrams for four Ohaus (models: Galaxy 4000D, Galaxy 160, D-5 Fabr. - Nr. 12336 and GT 2100) and two Sartorius (models 1404 B MP8-1 and 1002 MP8-1) balances. The balances are currently not usable. They urgently need the electric circuitry in order to get these balances repaired from local vendors. I called Ohaus (201) 377-9000 on October 18 at 9:05 AM and spoke to a Betty in Customer service. The **wiring manuals are not free** but I was able to get the following information on manuals which can be ordered, government prices, from Ohaus, 29 Hanover Road, Florham Park, N.J. 07932, Telex: 6853191 Ohaus, FAX (201) 593-0359. For Pakistan I was able to get the following information for a local Ohaus distributor, Rizvi and Company, P. O. Box 17514, Karachi, Pakistan 75300; or 2 Gulshan Center, SB 13, Block 13-C, Gulshan-E-Iqbal, Karachi Pakistan, phone 471116-477124, FAX 92-21-467716:

Balance	Model	Part No.	Cost
Ohaus	GT 2100	9755-25	$42.00
Ohaus	Galaxy 4000D	9755-21	$41.60
Ohaus	Galaxy 160	9755-23	$42.00
Ohaus	D-5 Fabr. - Nr. 12336	9755-38	$31.20

The Sartorius company (Mr. Bob Young) 1-800-645-3108 returned my call 9:58 AM on October 18 and provided me the following information in addition to sending the wiring diagrams for the two Sartorius balances mentioned above: There are two representatives in Lahore, W.E. Brothers located on Lake Road, phone 42-214-927, Telex 44518WEBROPK and Science Emporium, 20 Maclagon Road, phone 44959. If these can not be serviced by either of these two companies you can write to the Sartorius Corporation, 131 Heartland Blvd. Edgewood, New York 11717.

Zahid also needs the current style manual for the Journal of Arid Environments (see attached).

Additional information:
During the morning of September 29, 1993 I spent time reading the following report to give me background on the area and the project. This information was taken from the following source: Dryland Resource Management and the Improvement of Rainfed Agriculture in the Drier Areas of West Asia and North Africa. A case Study Use of Water Harvesting to Enhance Crop Production in Arid and Semi - Arid Areas of Highland Balochistan, Pakistan (34 pages without references and appendix)

Water harvesting has been practiced for a very long time by all farmers and the procedure lends itself to a very flexible type of agriculture with even the catchment areas being planted if water is adequate. However, KHUSKABA land is rarely ever 100% planted and is the predominant land type in Balochistan. Planting occurs only in areas where moisture has accumulated and not the whole field. Catchments are usually constructed on adjacent unutilized land and these catchments have a mean amortized life of 10 years.

In the survey reported in the manuscript 31% of the farmers lacked resources necessary to establish water harvesting techniques. Approximately 50% of the respondents indicated that finances were the limiting factor. However 50% of the respondents showed interest in adapting modern water harvesting techniques even though 33% of the respondents did not believe that water harvesting techniques would work. Financial constraints were reported among 51% of the respondents to prevent this type of improvement. It appeared from the survey that demonstration plots were the primary factor motivating those who used or were interested in current water harvesting techniques.

The literacy rate (ability to read) of the farmers of the area is approximately 28% based on a farmers perception survey conducted in 1992. However, it is the male that is literate, females in the area are mostly illiterate. The male to female ratio for the area is 1:1. The mean land holdings per farmer among those surveyed was 19.5 ha. Cropping intensity and rainfall for the area were highly correlated. The mean cropping intensity was found to be 38% in this study while in another study (1985-86) the intensity was found to be only 14%. The mean family size was 16 with 3 family members working full time in farm work. Farming formed the basis for 70% of the farm income. The major enterprises were wheat, followed by sheep and goat rearing. Those families leaving near towns frequently had family members who hired out as laborers.

The survey determined that it requires 14 ha of wheat (the local wheat is Landrace) to supply enough wheat flour to supply the consumption of an average family 916 members) in the area. The report also concluded that a short season spring wheat variety is needed for Balochistan. Approximately 13% of the farmers migrate. Migration begins in November with a return in April. The migration is in response to avoid freezing temperatures and scarcity of shrubs and grasses to feed their animals.

Wheat production on KHUSKABA lands occurring in 5, 3 and 2 years out of 10 can be ranked as good, normal and poor with yields of 223, 103 and 40 kg/ha likewise ranked as good, normal and poor, respectively. The farmers perception survey taken in 1992 indicated that 2:1 catchments produced 184% higher yields compared to the control with less production risk based on 6 years of data.

TO: Dr. Dr. Shahid Rafique

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your Progress Report for the period mid-June to mid-September 1993 and information on Current Contents, animal scales, wind turbines, a reference out of India on shed orientation and its impact on goat physiology in hot-dry environments, construction of equipment to measure black globe temperature, shrink, automatic weighing, body condition scores, and the reference for Lehner. If I have forgotten anything we or members of your team and I discussed please let me know. I have also included a paper by Altmann which I would appreciate if you would give it to Dr. Mirza for me. Also if I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for a most informative discussion on your research. I enjoyed working with you and the team on making tables using WordPerfect. Hopefully by now you are all experts! Please extend greeting to all the team, including Dr. Alvi, for me.

Site Visit Report: September 26 & 28, 1993

Project:
#4 - Improved Management of Indigenous sheep Breeds in Highland Balochistan

Site Visitor:
Dean M. Anderson

Current Status of the Research Project:
I was given the progress report which covers the period mid-June to mid September, 1983 and it is attached to this site visit report. Initially Dr. Rafique and I visited about his August trip to the Dubois, Idaho USDA Sheep Experiment Station. He indicated the time was well spent especially since he was able to work with PC SAS using the data he took with him from Pakistan. We then traveled over to the sheep feeding facility located at AZRI to view the current feeding study that was underway. The experimental design consisted of 4 animals/pen, 2 breeds (they would have preferred only one breed but due to lack of adequate numbers within breeds this was not possible), 2 pens/ration and 4 pens/breed. The Baluchi and Harni (white with brown spot on nose) had been put on this iso-nitrogenous trial three weeks earlier. This trial will continue into November-December. Shahid indicated that the Baluchi sheep have shown more liveweight gain than the Harni during the first three weeks of this trial. The net energy content of the two rations being fed is 2300 and 2700 kcal/kg, respectively. The rations consist of barley, cotton seed cake, sorghum, pea seeds, rice, wheat bran, molasses, urea, and a complex of vitamins and minerals. I did not see and was not given the exact formulation.

Animals remain in the pens at all times with water provided in galvanized buckets at all times (buckets filled 2 to 3 times daily) which allows a measure of water intake per pen. Lime was spread on the concrete floor to keep the fly population to a minimum even though pens are cleaned daily. The animals bed directly on the concrete floor in the 5 x 8 ' pens. The animals are weighed weekly first thing in the morning following an overnight fast without feed. I ask and was told that there was no possibly to obtain carcass composition data following the feeding trial.

The feeding trial conducted in January (see mid-March to mid-June 1993 third progress report) conducted with 16 Balochi lambs was iso-caloric with the crude protein content of the two rations being 12 and 17%, respectively. In this study there were only 2 lambs/pen (would have preferred 4 lambs/pen) due to lack of available animals.

In our discussion on the value of the animals I was told the price figured about 30 Rs/kg but animals were sold on a whole animal basis for about 1000 Rs/animal. This would make the mean weight per animal at between 35 and 40 kg. I learned that 40 to 50% of the local livestock receive veterinary treatment, however, the nomads do

not protect their animals. Some nomads will accept free medicine but will not purchase medicine, according to Shahid they would rather "buy guns". These nomads may range over a distance of 400 to 500 miles in a year. I asked and it was agreed that this makes range management a challenge in Balochistan.

Project Responsibilities:
No apparent changes were observed since January 1993 and none were brought to my attention. However, Dr. A. S. Alvi replaced Roider Khan as Director of AZRI in March 1993. This administrative change did not appear to have any affect on Dr. Rafique's project.

Problems:
None were brought to my attention.

What suggestions/recommendations did you make:

1) for next stage of project--action and <u>time</u>

I suggested that ambient air temperatures, both wet and dry be taken inside the housing facilities at least daily and preferably more often especially if "hot" weather is evident. A thermometer was place in the "metabolism" building later during the day of September 26. In addition, I indicated that black globe temperature would probably be an even better indication of what the animal's biology is actually experiencing and that this information can be obtained in a relatively inexpensive fashion. The instrument and its construction is being included with this report in the manuscript entitled "Importance of field studies in stress physiology" by M.K. Yousef. In addition, I suggested that wind turbines (I would guess a minimum of two) be added to the roof of the animal barn to help circulate air and reduce temperatures. For further studies past 1994 I asked if it were possible to plant trees (conifers or deciduous ones) near the buildings to reduce the heat load coming from the intense sunlight and they said this would be considered. The information on wind turbines to remove hot air from attics may be useful in helping a local fabricator design such as devices for the "metabolism" building. This might be quite appropriate to remove hot air from the building in which the feeding studies are being conducted or feed is being stored.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to the US each time for review.

Shahid prefers to use a journal that does not have page charges and Elsevier fits this requirement. He plans to have 2 or 3 articles ready for the May 1994 conference proceedings using the following time guidelines for the eventual Small Ruminant Research articles. Article titles were not discussed. However, one article will deal with supplementation at 2 sites for 2 years.

WEEK OF NOVEMBER 21ST

Dean Anderson will receive manuscript(s) from Pakistan.

WEEK OF DECEMBER 12TH

Dean will return manuscript(s) with corrections and suggestions to Pakistan. Suggestions and corrections will be made directly on the 3 1/2 " disk copy in all capital letters.

WEEK OF JANUARY 15TH

Dean Anderson will receive the revised manuscript(s) from Pakistan with suggestions and corrections incorporated and send each manuscript out to four reviewers with the requirement that reviews must be back in Las Cruces on or before March 8.

WEEK OF MARCH 8TH

Dean Anderson will return a minimum of three reviews per manuscript to Pakistan. Authors will then work with Dr. Umar Khan Baloch in preparing their manuscript(s) for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of manuscripts to be presented at the May 1994 conference.

Other topics, if discussed:

U.S. Research Visits:
No further research visits discussed

Consultant Visits:
None proposed

Equipment:
1) Shahid asked if money would be available to repair the east end of the feeding facility so feed/supplement could be stored close to the animals? The size of this structure would be about 12 x 15'. I could not give an answer on this question and indicated that it would be included in my site report. 2) Apparently ICARDA will pick up the cost for the PC version of SAS according to Shahid. 3) Shahid is wanting to purchase a single animal electronic sheep scale.

Payments/Financial:
Shahid asked if BOSTID would be able to pick up the cost of the following items: 1) The Journal of Animal Science (JAS) offers a computer based reference retrieval system for Vol. 1 (1942) to Vol. 70 (1992) for $250.00 U.S. Shahid would like to know if it is just the citations or if abstracts are included or possibly is this the entire manuscript on disk? The minimum requirements for this system must include citations and abstracts, otherwise Shahid is not interested in the retrieval system. I could not answer what the system offered since I have not used it in my research. 2) He would like to subscribe to the journal Animal Production and wonders if BOSTID would pick up the subscription cost? 3) Shahid ask if he saves money now is there a way that this money could be used past May 1994? Again I did not have an answer but indicated the question would be included in by site visit report.

Items to Send:
Enclosed is information on Current Contents, animal scales, wind turbines, a reference out of India on shed orientation and its impact on goat physiology in hot-dry environments, construction of equipment to measure black globe temperature, shrink, automatic weighing, body condition scores, and the reference for Lehner and a paper by Altmann to be given to Dr. Sarwat N. Mirza.

LIST OF SINGLE ANIMAL SCALE MANUFACTURERS

8/17/89

Name	Address	Phone
Cardinal-Detecto Scale Mfg. Co.	203 Daugherty St., E. Box 151 Webb City, MO 64870	(417) 673-4631
Jenssen Scale	635 Hulet St. San Jose, CA 95125	(415) 839-7236
Senstek	P.O. Box 340 Saskatoon, Sask. Canada	(306) 374-3966 1-800-667-3921
Toledo Scale	350 W. Wilson-Bridge Rd. Worthington, OH 43085	(614) 438-4533
Velasco Scale Co.	P.O. Box 2230 122 S. Avenue A Freeport, TX 77541	(409) 233-5461
Weigh-Tronix, Inc. (Main Office)	1000 Armstrong Dr. Fairmont, MN 56031	1-800-533-0456
Western Scale Co., Ltd.	1670 Kingsway Ave. PT. COQ. Vancouver, B.C. V3C3Y9 Canada	(604) 941-3474 Telex 04-353539

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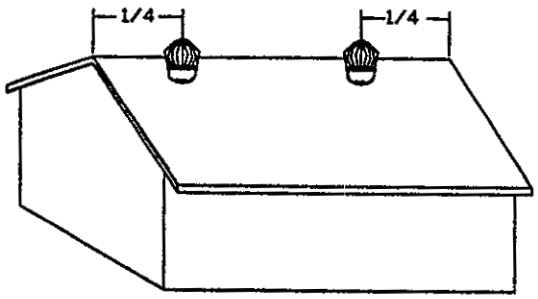
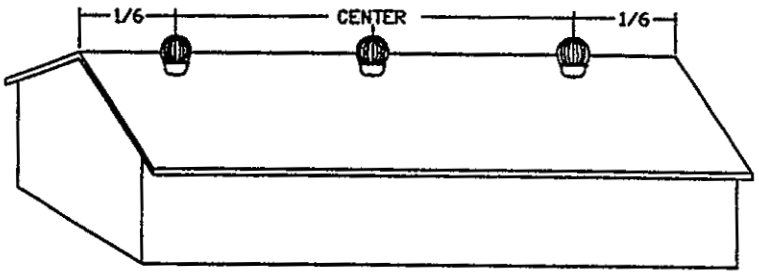
TURBINE LOCATION DRAWING

Near the peak of the roof on a rear slope with the turbine top exposed to the wind from all directions. When installing two, place each one 1/4 the distance from each end of house. When installing three, place one in the center and the other two 1/6 the distance from each end of the house.



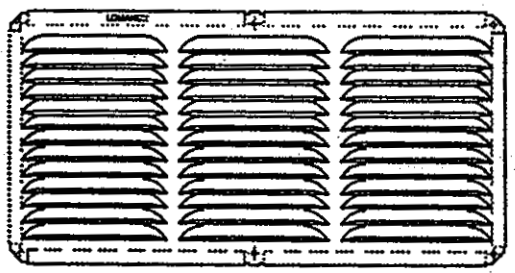


Selecting The Location

NOTE: To determine proper ventilation for your home,see chart below.

PROPER EXHAUST REQUIRES ADEQUATE INTAKE!!!

	EXHAUST	INTAKE
SQUARE FT.	GT-12	C816
1,400	2	16
1,800	3	16
2,200	3	24
2,500	3	36

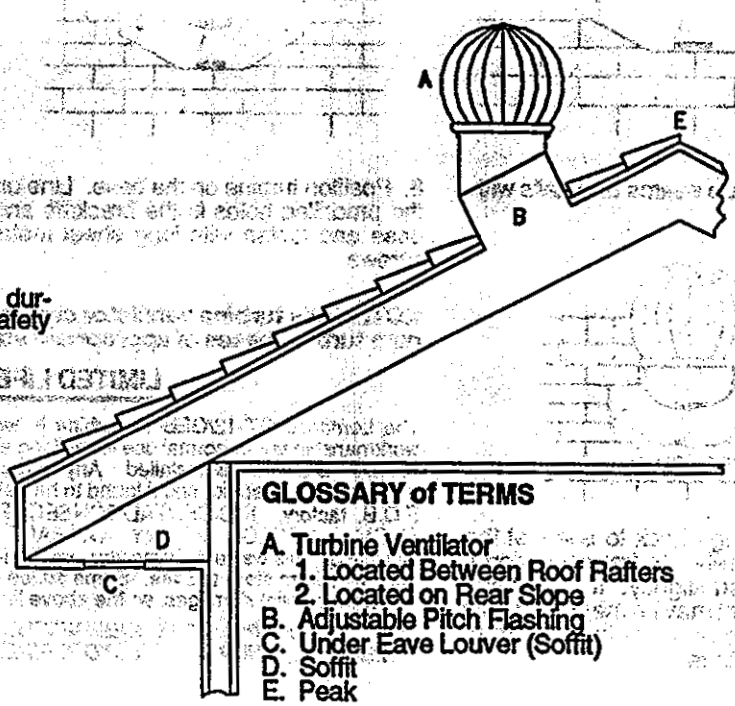


C816 SOFFIT VENT

TOOLS YOU NEED

Screwdriver
Carpenters Level
Key Hole/Saber Saw
Putty Knife
Utility Knife
Drill
Hammer
Ruler

WARNING: Sharp edges are exposed during installation. Use gloves and other safety equipment to avoid accidents.

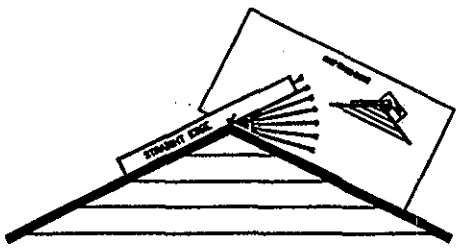


GLOSSARY of TERMS

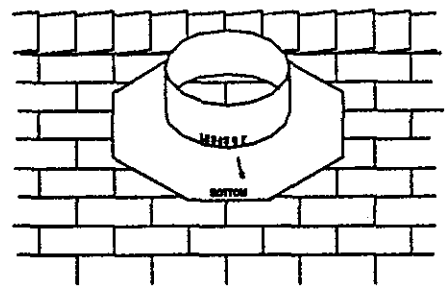
A. Turbine Ventilator
   1. Located Between Roof Rafters
   2. Located on Rear Slope
B. Adjustable Pitch Flashing
C. Under Eave Louver (Soffit)
D. Soffit
E. Peak

T.M. Lomanco®
P. O. BOX 519
JACKSONVILLE, AR 72076
(800) 643-5504

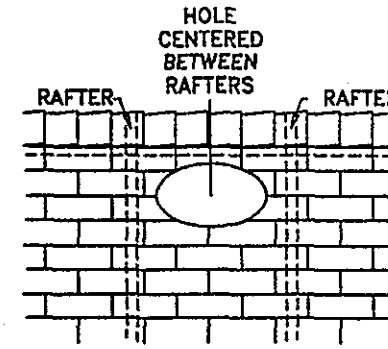
INSTALLATION INSTRUCTIONS FOR GALVANIZED TURBINE GT-12/GEB-12



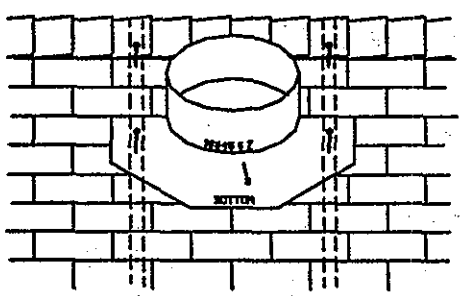
1. To determine roof pitch, use gauge on carton flap, place on peak of roof and position straight edge as shown. Read roof pitch from printed gauge parallel to bottom of straight edge. This turbine is designed to fit 1/12 to 7/12 roof pitches.



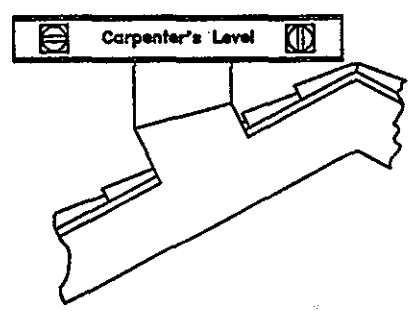
2. Slip elbow onto base. Turn elbow to align roof pitch number on elbow with indicator line on base and secure with three (3) sheet metal screws provided.



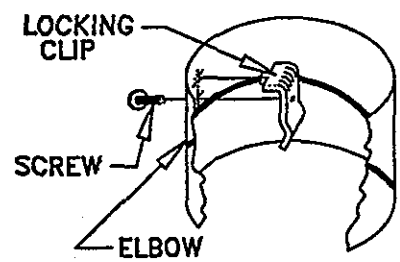
3. After finding the general location of turbines, see location drawing on the back of this page, mark a hole on shingles between rafters. Cut hole as marked. (NOTE: Turbines may be positioned over a rafter, do not cut the rafter, however this will result in a slight decrease in efficiency.)



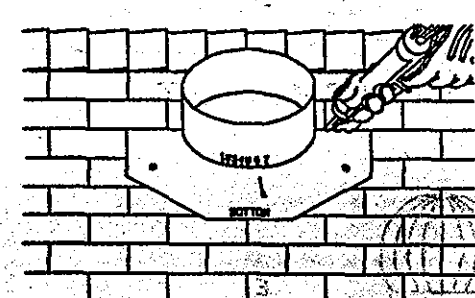
4. Lift tab of shingles, slide top half of flashing under shingles and secure with nails as shown.



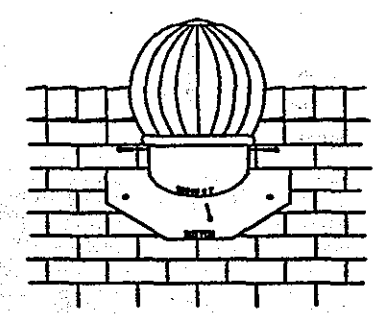
5. Rotate top of elbow to level position by turning counter clockwise.



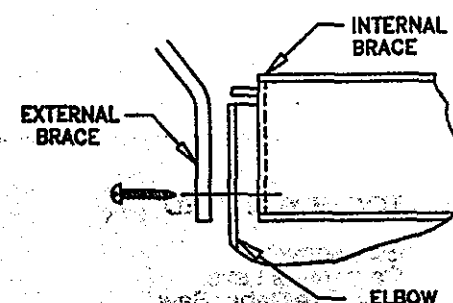
6. Place locking clamp across seam and tighten with machine screw.



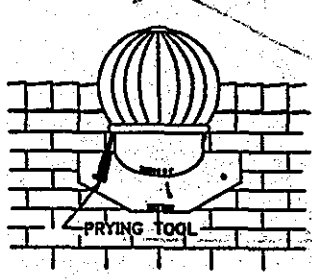
7. Seal all outside seams and nails with roofing cement.



8. Position turbine on the base. Line up the predrilled holes in the brackets and base and fasten with long sheet metal screws.



8a. NOTE: If you are installing a GEB-12 be sure to insert screw thru the external brace, elbow and internal brace.



9. After installing check to see that the turbine turns freely. In transportation it may have shifted slightly. If necessary, minor adjustment may be made by gently prying lowest point of turbine upward to remove any wobble.

NOTE: This turbine ventilator can be installed on existing galvanized or aluminum turbine bases of appropriate size.

LIMITED LIFETIME WARRANTY

The Lomanco GT-12/GEB-12 turbine is warranted to be free from defects in materials and workmanship under normal use for as long as the consumer purchaser owns the home on which the GT-12/GEB-12 is installed. Any defective merchandise must be returned to the factory, transportation prepaid, and if found to be defective, it will be repaired or replaced free of charge, F.O.B. factory. INCIDENTAL/CONSEQUENTIAL DAMAGES TO PROPERTY RESULTING FROM A BREACH OF ANY WARRANTY MENTIONED HEREIN ARE EXPRESSLY EXCLUDED. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

WARRANTY APPLIES TO RESIDENTIAL USE ONLY. WARRANTY IS VOID IF USED ON FIREPLACE, CHIMNEY, OR STOVEPIPE.

TO: Dr. Dr. Shahid Ahmad

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your Progress Report for the period June 1993 through August 1993, a copy of a letter you sent to Dr. Bale concerning equipment needs, information on the landscape design of ponds from our Soil Conservation Service. The SCS has promised a list of additional literature that can be ordered. I will forward it upon its arrival. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for the hospitality you showed to me while I was in Islamabad. Please give my best wishes to Mr Shafiq and Mr Aslam. Please give special greetings to Mr. Moshabbir and tell him that I visited with Dr. Mirrza at Quetta about his video expertise and the use of video technology in animal behavior studies. I also visited with Dr. Qureshi about your pending interactions with the water harvesting work at Quetta and the potentials for this interaction seem most exciting.

Site Visit Report: September 19 & 20, 1993

Project:
#11 - Development of Management Strategies to Increase the Productivity of Eroded Areas and Watersheds

Site Visitor:
Dean M. Anderson & Jim Oster

Current Status of the Research Project:
On Sunday the 19th Jim Oster and I met with Dr. Shahid Ahmad at NARC beginning at 8:30 AM. We were given the June 1993 through August 1993 progress report which is included in this site visit report. We were shown the 16 small 1 m^2 ponds and were told that seepage had earlier been a problem. This has been controlled and an additional 3 earthen ponds have been dug in the immediate vicinity to investigate lateral seepage. These ponds were not filled with water on the day we were there. We were later taken to the GIS facility and introduced to personnel associated with phase of the project. This work is focusing on erosion control. Also we where taken to the laboratory where 1988 to 1992 D Base IV data is being converted into BASIC for use in modeling.

CREAMS and other models are being investigated as tools to develop management strategies. Ahmad believes that once all equipment is up and running it will take 1 month to put the models together. It appeared to me that Dr. Ahmad has assembled a competent team of professionals to do the work. In addition, to the GIS work Ahmad is incorporating the use of videos into his research especially in technology transfer. Mr. P. M. Moshabbir showed me some of their equipment including a Panosonic M8000 camera. We discussed the 3 world formats (PAL, SECUM and NDSC) and the capabilities of their Sony to play all three formats. Following lunch we traveled towards Murray approximately 37 km before reaching Satrameel to examine one of the three experimental catchments and the surrounding re-vegetation which includes both herbaceous and wood species. We viewed some of the experimental plantings and a nursery where seedlings are being grown to sizes ready for transplanting. It was interesting to note that Shahid was trying many different plants some of which had been supplies to him via friends. He even had some pecans in pots that were about 4" high. When we walked through the "orchard" Ahmad explained the "eye brow" type catchments build around each tree as means of holding water during the rainy season.

On Monday September 20 Mr. Muhammad Shafiq and Mr. Mohammad Aslam took me to view additional sites at Fatehjang. He I was shown what positive affects ground cover in the form of grasses and trees (fuel and fruit) has had on stopping erosion and changing the microclimatic conditions. I ate fresh guava which was ripening on some of the trees that had been planted on the previously eroded sites. The deep soils are

severely eroded where overstocking and the complete harvest of woody plants has occurred. However, when managed for sustainable yields the results are dramatic.

However, it appeared to me that the technology transfer of this improved rangeland management was progressing slower than it should. Except for blaming human nature and its resistance to change I do not know what the correct answer is. Even though the results of this research which has been going on for several years is quite dramatic the surrounding farm lands have not adopted the technology in mass.

Later in the day I was taken to a native farmers village. Here I saw a pond that will gradually be improved to insure optimum stock and human water requirements. The interesting thing about this private farmers village was that this man worked on the experimental farm and his village was adopting the "technology" being advocated by Dr. Ahmad's research. The willingness of this farmer/experimental farm laborer to adopt this technology was aiding in getting the technology transferred to the surrounding farmers with a "real world" demonstration.

Project Responsibilities:
No changes discussed except that the Co-PI, Mohammad Aslam, has increased the amount of time being spent on the project from 50% to 100%.

Problems:
None were brought to my attention.

What suggestions/recommendations did you make:

1) for next stage of project--action and <u>time</u>
During the week of December 12 I will receive one manuscript on seepage. The manuscript will be handled according to the following schedule:

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect if possible, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to the US each time for review.

We discussed referred journals that would be appropriate in which to publish the finding of this project. The following journal was discussed: Agriculture Water Management published by Elsevier in the Netherlands. In addition Ahmad plans to prepare a 4 to 6 page leaflet in the local language of Erdu along with a video to aide in technology transfer.

WEEK OF DECEMBER 12TH

Dean Anderson will receive a manuscript on seepage from Pakistan.

WEEK OF JANUARY 15TH

Dean Anderson will return corrections and suggestions on manuscript back to Pakistan.

WEEK OF MARCH 8TH

Dean Anderson will receive the revised manuscript and send it out to four reviewers with the requirement that reviews must be back in Las Cruces on or before March 31.

WEEK OF APRIL 1ST

Dean Anderson will return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST

Dr. Ahmad will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of a manuscript(s) to be presented at the May 1994 conference.

Other topics, if discussed:

U.S. Research Visits:
It is Dr. Ahmads plan to visit the US during February 1994 with the same emphasis as indicated in the letter Dr. Bale sent to me dated July 21, 1993.

Consultant Visits:
Dr. Ahmad hopes to have a consultant, someone who is an expert in GIS, visit Islamabad following his visit in February.

Equipment:
The software for the UNIX system for their 486 computer* is still not available and is critically needed. A second priority is the need for 2.4 kv of power protection units. He prefers receiving two 1.2 kv UPS systems so they can be installed by local vendors. Also a transformer is needed. A copy of a letter outlining these requests has previously been sent to Dr. Bale based on the site visit of Mrs. Yvonne Forsberg. However I told Dr. Ahmad I would also enclose a copy of this letter in my site visit report.

* delivered in Oct. 93

Payments/Financial:
None discussed

Items to Send:
Dean will contact SCS and ask for publications on pond construction, erosion and conservation practices especially dealing with water harvesting. If the publications are available at the time this site visit report is mailed the publication will be included otherwise they will be included under a separate mailing.

SITE VISIT REPORT

BOSTID PROJECT #11

September 19, 1993

Jim Oster

Title: Development of resource management strategies to raise productivity of eroded areas and watersheds using computer aided techniques and field validations.

P.I. Dr. Sahid Ahmad

Objective 1: to identify low-cost water harvesting techniques/structures/amendments. We observed and discussed several methods to capture runoff water from small areas including "eyebrow terraces," small basins between orchard trees, and the use of a grass species. The latter grows in a tightly bunched, tall manner that can create a runoff barrier when properly planted. The basin technique in the orchard that we saw was easy to construct by hand. The basins seemed to be too small (1 X 0.5 X 0.15 m; 0.075 cubic meters storage capacity) for the runoff area. The calculation of the optimum size would require consideration of rainfall rates and amounts, potential runoff, and geometric constraints imposed by the tree spacing.

Objective 2: to select appropriate forage, fruit, and forest plants for different conditions. The plant nursery at the field site we visited contained a considerable number of forage, fruit and forest seedlings. The number of plants and species were impressive as well as the size of the nursery (about 15 X 30 m). Cooperation with plant scientists was also mentioned.

Objective 3: to develop low cost farm reservoirs for supplemental irrigation and to prepare guidelines for construction and us by the farming community. Work continues at the National Agricultural Research Center on a small, pilot scale to identify and quantify the effects of different methods to reduce seepage. Progress reports and the discussion during the day touched on field activities elsewhere. The researchers know that integration of pond construction and management into existing farming practices will require further modifications and tests. For example, during the construction of a pond, farmers use animals to compact the soil along the bottom of the pond.

The project leaders realize that farmer adoption will be hastened with demonstration projects where properly constructed and maintain ponds are put into place. In addition, written guidelines for construction and maintenance methods need to be written and distributed as part of a proactive effort to initiate large scale adoption of small farm reservoirs by farming communities. The work underway is a good beginning and it seems the project leaders understand the need to identify construction and maintenance procedures to assure the farmers some measure of hope that, if the procedures are followed, ponds will work and the resulting captured water will increase the resource base upon which the farmers rely for their livelihood.

Objective 4: to estimate the benefits of water harvesting, supplemental irrigation and production of specific forest plants, forage and fruit trees. The number of single plant trials at the field site we visited indicate the project leaders are taking advantage of many opportunities to try different plant species and cropping procedures. Examples of projects underway include planting of new tree species that provide a renewable resource for wood,

propagation trials to increase the supply of native olive trees, pruning of olive bushes to foster taller growth, and planting of citrus and grapes into the existing landscape.

Objective 5: to identify management strategies appropriate for three levels of farmer investment capability. I think this objective is related to the efforts to develop GIS capabilities. Training of four technicians, by a Japanese scientist, has been underway for several weeks. This training includes data manipulation of digitized satellite imagery and is being funded by another nonBOSTED grant. In the meantime, Dr. Ahmad has hired a computer literate person to develop mathematical procedures, using BASIC, to analyze water runoff and climatic data collected at the instrumented water sheds. It's his objective to begin the computer phase of his work, including GIS, by learning how to manipulate the large data bases that are the essential components of any computer modeling/testing research program. His leadership skills appear to include the ability to select and motivate intelligent, self starting people.

CONSULTANT: Dr. Ahmad is a competent researcher and should be given considerable freedom in selecting a consultant. He wants the BOSTID project to be well underway before visiting relevant research laboratories in the U. S. One of the objectives of this visit will be to establish contacts with perspective consultants. In other words, Dr. Ahmad does not plan to request a consultation visitation until after his visit to the U. S.

Objective 6: to validate the best strategies with field trials. One can argue that work on this overarching, general objective is underway because instrumented watersheds are available, and pilot research studies on pond liners, and work on the data base for GIS are both underway. It appears that good progress is being made on the building blocks necessary to assemble the information needed to begin validation studies -- either by modeling or large scale field demonstration projects and field trials. One tends to see the blocks but not the integration that this objective will require. However, this is to be expected. The good news is that the research leader appears capable of developing the teamwork among research colleagues from the various disciplines and among the technical staff that this objective requires.

file name lbostid1

TO: Dr. Ghulam Abbas Miana

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your September 15 Project Report, a letter from you to Dr. Bale concerning the proposed visit to the US, Dr. Said Mir Khan's letter also for a proposed visit to the US, two letters sent to you concerning publications resulting from research conducted under project 12, and copies (3 pages) of information on the Biotronette Mark III Environmental Chamber belonging to Dr. Khan. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for the extra special hospitality you showed to me while I was in D. I. Khan. Thank you for all the meals you provided especially the delicious meal prepared at your home. I shall never forget the delicious Russian Quail fixed by your wife. I also thank you for all the chauffeuring and the tea strainer. I have used it since my return and will always think of you and my trip to D. I. Khan when it is on my table. Please give my best wishes to all the team and a special greeting to Dr. M. I. Khattak. I sure did appreciate his hospitality and delicious meal I had in his home after my travels to Taunsa!

Site Visit Report: September 23 & 24, 1993

Project:
#12 - Integrated control of Insect Pests (Fruit Flies, Red Pumpkin Beetle, Aphid and Mite) of Muskmelon in Dera Ismail Khan Division

Site Visitor:
Dean M. Anderson
For David Ferro

Current Status of the Research Project:
Dr. Miana briefed me on the project in his office with an emphasis on the point that synthetic pesticides are frequently too costly for producers to purchase and that natural products were at least in part the answer for the future of Pakistan agriculture. Our visit was followed by a walk through the campus of Gomal University to look at neem trees, his chemistry laboratory and field plantings of neem seedlings and muskmelon. Dr. Miana pointed out that the soil on the main campus was not "good" for growing muskmelons. We then traveled to the Agriculture campus and visited field planting of muskmelon. Melon season is between April and September and it is the destruction of the fruit that is most important in the control of insects. The melon plants I was shown did not look very robust, probably because it was not the season for optimum field growing conditions.

When we discussed publications Dr. Miana discussed the fact that he would like to patent neem products he is working on and he was concerned on how a publication might affect the patent process. I could not give any suggestions on this point, he plans to look into this and publish accordingly. I learned that commercial factories are currently located in Michigan in the US, one in Thailand and a couple in India. Evidently Saudi Arabia has one of the largest neem plantations. To start plants from seeds the fruits must be fresh and this "window" is quite narrow according to Dr. Miana.

In my meeting with Dr. Khan I was given an overview of the insect portion of the project. The hatching of the eggs inside of the melon fruit by fruit fly *Dacus cucurbitae*, which came in from Afghanistan in infected fruit, takes approximately 5 to 7 days and is very temperature dependent. Currently there are no muskmelon varieties that are resistant to this insect and 95% losses in the crop are not uncommon. Guava fruit is also affected by this insect. The opening through which the eggs are laid is "plugged" following the laying, however, bacteria also enter during this process thus increasing the amount of destruction to the fruit.

Insects are trapped in pheromone traps using two different chemicals to aid in the scientific counting of population dynamics. with daily counts made of the dead males The population is assumed to be 50-50 male and female and the counts of sexes are

correlated with micro-meteorological parameters.

I was shown the remnants of a field planting of muskmelon in which the plants had been dusted with several treatments. I learned that the red pumpkin beetle is more of a problem on irrigated lands. The July through September progress report attached contains details of the current research progress.

Project Responsibilities:
No apparent changes were observed since January 1993 and none were brought to my attention. However, Dr. M. I. Khattak has replaced Dr. Miana as Vice-Chancellor of Gomal University. It did not appear that this change has negatively affected the project in any way. Apparently the working relationship between Drs. Miana and Khan is amiable at this point and the project objectives are being met with a team effort.

Problems:
Dr. Miana would like to know if the Rs that have not been spent in this project can be spent to buy other equipment or glass ware? I was not able to give an answer to this question but indicated I would include this question in my site visit report so it can be addressed by Dr. Bale. I asked if Dr. Miana had a list with catalogue numbers for the equipment/glass ware wanted but he did not so this is not included in this site visit report. Dr. Miana also indicated the balance has not yet arrived but is needed.

The LAb-Line Biotornette Mark III Environmental Chamber Model 846/846-3 which was purchased for Dr. Said Mir Khan's part of the project does not appear to be adequate for what he proposed. Obviously this mistake occurred during the ordering of this equipment so only partially corrective measure can be taken at this time. Of the three problems brought to my attention I have the following suggestions.

1) I was told that he wanted to be able to control ambient temperatures inside the chamber either above or below those of ambient conditions. Clearly this model chamber will not control temperatures to below those of ambient conditions. The only quick and relatively cheep solution to cooling below ambient conditions in this chamber would be to fabricate duct work and appropriate insulation of the air ducts and cabinet into the top of the chamber (exhaust fan openings already present above the light bank) and provide an external source of cooled air from a refrigerated air conditioner unit. This approach though not equal in quality to a controlled environmental chamber might provide "controlled conditions" to an otherwise useless cabinet provided that the cooling requirements are not too low. Obviously the heat load of the light bank must be dissipated before any further cooling inside the cabinet will be realized.

2) The heat tape supplied with the unit appears to have two major problems. First the male connector was not supplied with the heat tape. Since all plugs in Pakistan

have a different configuration compared to US electrical plugs the female receptacle in the environmental chamber will not match the male type of male plugs available locally in D. I. Khan. I would guess such a heavy duty plug would cost no more than $1.59 at any hardware store in the US. However, of more concern to me was the heating tape supplied. Enclosed is a copy of the installation instructions for the Model AU & U pipe heating cable. From my interpretation of the instructions the cable contains an automatic thermostat that is preset so the cable will heat only if the temperature of the surface around which the cable is wrapped drops to or below 35 F. A preset thermostat is not what is needed by Dr. Khan, especially since the chamber does have a thermostat that regulates power to the outlet in which the heating tape should be connected. I recommend that a new heating cable be supplied with a US male plug already attached. I am guessing, but I would think that such an item should be under $25.00. Possibly Lab-Line Instruments would exchange the unit which is now in D.I. Khan at no charge. The heating cable could easily be shipped by air mail to fit into an 8 1/2 x 11" mailer.

3) One final problem has to do with the fluorescent lights inside the cabinet. Apparently rapid-start 40-watt, 48"-long tubes are required. Dr. Khan is attempting to use tubes from a local supplier and not the "grow type" rapid-start bulbs recommended by Lab-Line Instruments, Inc.. Apparently the "starters" supplied with the cabinet are not matched to the requirements of the local fluorescent tubes Dr. Khan is attempting to use. My recommendation was for Dr. Khan to speak with a local electrician and that possibly he would need to change the US starters supplied with the cabinet to starters appropriate for fluorescent tubes of the "non-rapid start" manufactured in Pakistan.

What suggestions/recommendations did you make:

1) for next stage of project--action and <u>time</u>
I was told that the "soap-neem oil" was killing the leaves when applied. I asked if the soap might have too high a pH and was causing damage to the leaves and if the "soap" had been evaluated separately from the neem oil and was told it had not been. This I strongly encouraged be done in order to determine which product or if the products together were causing the problem. I also suggested that a "mild" dish detergent such as the US product Joy be tried in low concentration. This was based on some successful results I had in using dish soap as a surfactant myself many years ago. I also commented that we have successfully used diesel as an emulsifier in applying 2,4,5-T in the past here on the Jornada.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to Dr. Ferro each time for review.

The proposed places of publication (they have the style manuals) would be Journal of Economic Entomology to include 2 seasons of data on the neem. I was told this publication will be ready by March 1, 1994. Dr. Miana's contribution will include a chapter in the CRAC Volume on Natural Products: Opportunities for Crop Protection (see attached letter). In addition he is thinking about publishing articles in the Journal of Natural Products Chemistry and Phytochemistry with one focusing on a review of neem work and the other dealing with the chemistry of neem. This publication has currently been completed according to the attached letter. I suggested to Drs. Miana and Khan the deadline format for reviews I have asked my 5 projects to follow. The basic outline of events are as follows:

WEEK OF DECEMBER 12TH
Receive one or more manuscripts on from Pakistan.

WEEK OF JANUARY 15TH
Return manuscript(s) back to Pakistan with suggestions and corrections .

WEEK OF MARCH 8TH
Receive the revised manuscript(s) and send out to four reviewers with the requirement that reviews must be back in Dr. Ferro's office on or before March 31.

WEEK OF APRIL 1ST
Return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST
Authors will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of manuscripts to be presented at the May 1994 conference.

Other topics, if discussed:

U.S. Research Visits:
Dr. Ghulam Abbas Miana and Dr. Said Mir Khan each give me letters I requested to have included in this site visit report indicating proposed places they would like to visit in the US prior to May 1994.

Consultant Visits:
None proposed

Equipment:
Both Drs. Miana and Khan brought several items to my attention. These have been completely discussed above.

Payments/Financial:
None discussed

Items to Send:
Dr. Miana requested the name and address of the NNSU entomologist interested in African rue. The man's name and address is:

Dr. David B. Richman
Department of Entomology, Plant Pathology and Weed Science
New Mexico State University
Las Cruces, New Mexico
88003-0003
USA
Phone (505) 646-3542

TO: Dr. Dr. Rafiq Ahmad

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your Progress Report up to September 15, 1993 and a copy with selected examples for the *Journal of Arid Environments*. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for lunch and the hospitality you showed to me while I was with you and your team. Please give my best wishes to Mr. Shoaib Ismail and I trust the young lad who is in charge of the watering is still performing up to your expectations.

Site Visit Report: September 30, 1993

Project:
#13 - Selection of Mesquite for Production of Grazable Biomass and Fuelwood in Stressed Land

Site Visitor:
Dean M. Anderson

Current Status of the Research Project:
I was given the progress report which covers the period up to September 15, 1993 and it is attached to this site visit report. I was able to only spend 2 1/2 hours on this project. Therefore, I concentrated on learning what changes had taken place, especially in the field, since my visit in January. However, before leaving I did briefly visit the laboratory facilities being used to study the relationship of rhizobium growth to different salinity levels. The lady (I did not get her name written down) who showed me this work indicated that the project was on schedule. I spent the majority of time in the field with Rafiq and Ismail. We visited the saline well and nursery in addition to other facilities being constructed on the site but which are not part of the BOSTID project.

I was shown how rabbits had cut many of the stems of the new *Prosopis* plantings. It was interesting to note that once severed from the root stock the stem was left and was not eaten. I was told that the majority of this damage occurred either early in the morning or between 6:00 and 7:00 PM in the evening. To reduce the incidence of rodent damage the basins in which the plants were growing were being covered with mesquite branches obtained from the surrounding native mesquite, this protection appeared to provide adequate protection to further rabbit damage. The plants were all grown from seeds and were changed from fresh to salt water in 1.5 months before being transplanted to this field site. Each depression in which a single mesquite plant is growing is being watered with approximately 13 l per irrigation which is currently twice every 7 days. There are four patterns of watering sequence used. A pattern is changed after every 2 weeks to reduce the possibility that watering sequence is affecting growth of the plants. Weekly evaluations are made on new rabbit damage.

Apparently even if the above ground stem is severed the depressions are still watered as though they contained plants. This is because there is often regrowth from the rootstock. Obviously these plants will have less above ground biomass than those plants which were never defoliated by rabbits. This will need to be considered prior to statistical analysis of the growth data. I did not understand the exact criteria on when a plant that had been browsed by rabbits was determined to be dead and a similar accession was replanted in its place. I trust this will be clarified in the manuscripts to be written for the May 1994 conference proceedings.

I was concerned about the actual volume of water being applied to each plant at each watering. I was told that the pump (it did not produce a constant stream of water while I was there) and recharge rate of the well prevented the use of a flow meter to monitor the volume of water delivered to each depression in which a *Prosopis* was growing. However, even though the volume of water in the well that can be pumped at the end of a period of watering is less than at the beginning I was assured that the salinity content of the irrigation water did not change over time. Because of a variable flow rate this also negates the accuracy of using a stop watch. However, even though the time approach is far from accurate I encouraged Dr. Ahmad to consider this approach since without some measure, the volume of water delivered to each of the 20 *Prosopis* accessions in the completely randomized block design could be variable enough to influence growth and conclusions to be drawn on growth rate.

Project Responsibilities:
No apparent changes were observed since January 1993 and none were brought to my attention.

Problems:
None were brought to my attention.

What suggestions/recommendations did you make:

1) for next stage of project--action and <u>time</u>

I failed to mention to Dr. Rafiq the conversation Dr. Akhtar Nawaz Khan and I had while I was in D. I. Khan on the potential opportunities that might exist if these two scientists could interact with each other on their salinity research. I simply encourage Dr. Rafiq to contact Dr. Khan at the Faculty of Agriculture, Gomal University, Dera Ismail Khan at his earliest convenience so that both scientists are aware of their respective research projects.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect if possible, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to the US each time for review.

Rafiq plans to have 2 articles to send to the Journal of Arid environments using the following dates as guidelines. One article will be entitled "Selection, Growth and Development of *Prosopis* Under Various Salinity Regimes" and a second entitled "Rhizobium Activity in *Prosopis* Under Saline Conditions".

WEEK OF DECEMBER 31ST

Dean Anderson will receive manuscript(s) from Pakistan.

WEEK OF JANUARY 20TH

Dean will return manuscript(s) with corrections and suggestions to Pakistan. Suggestions and corrections will be made directly on the 3 1/2 " disk copy in all capital letters.

WEEK OF FEBRUARY 15TH

Dean Anderson will receive the revised manuscript(s) from Pakistan with suggestions and corrections incorporated and send each manuscript out to four reviewers with the requirement that reviews must be back in Las Cruces on or before April 1.

WEEK OF APRIL 1ST

Dean Anderson will return a minimum of three reviews per manuscript to Pakistan. Authors will then work with Dr. Umar Khan Baloch in preparing their manuscript(s) for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of manuscripts to be presented at the May 1994 conference.

Other topics, if discussed:

U.S. Research Visits:
I was told by Dr. Ahmad that his recent trip to Dr. Felkers's laboratory located at Texas A & I University was a success especially their field trips which allowed Dr. Ahmad to see the various uses that are being made of mesquite wood. He spoke of golf clubs, flooring and furniture which he saw made from *Prosopis*. During this trip he also learned of a variety of pistachio being grown in Iran which is very salt tolerant. I encouraged him to visit with the people at AZRI in Quetta about this work. He indicated that he has been invited to attend a meeting in India during October 1993 (I was not given the exact dates). He wondered if funding was available for both he and Shoaib Ismail to attend. I indicated that the time frame was probably too short but that I would include the request in my site visit report. Shoaib Ismail was to give me a travel request for the India meetings on who would be contacted, why he wanted to attend and what was to be accomplished as a result of this travel. However, I did not receive this before I left Karachi University and there were no messages left at the Avari Towers for me before leaving Pakistan.

Consultant Visits:
None proposed

Equipment:
Evidently the leaf area index meter is still not 100% satisfactory, two parts are adequate but a third component had still not arrived, I was told that Yvonne Forsberg was working on this. Also the chemicals for the gas chromatograph are needed, and BOSTID is waiting for a response to the September 20 letter from Mrs. Forsbergh. BOSTID is not authorized by USAID to purchase non-US goods, so the part for the conductivity meter cannot be purchased through this program.

Payments/Financial:
None discussed

Items to Send:
Rafiq requested a current copy of the style manual for the Journal of Arid Environments which is enclosed.

SITE VISIT REPORT

BOSTID PROJECT #15

Jim Oster

September 30, 1993

Objective 1. To test identified short duration lines/cultivars for moisture stress conditions to be grown in winter on residual moisture following rice. Eighty four wheat varieties and fifty nine barley varieties were tested during the 1992-93 crop season in replicated (n=3) "preliminary row trials (ref: project proposal)" at both Thatta and Dokri. Statistical analysis indicates significant yield differences occurred for both crops.

The team selected the ten best varieties at each location for both crops and proposed to begin "varietal trials (ref: project proposal)" and to expand the seed supply. I questioned whether this should be done because one year's data is not sufficient for selecting the best varieties. We agreed that "varietal trials" will not be started until data from at least two years of "preliminary row trials" are available. The researchers are aware that three years of data is the accepted norm for selection of varieties for "varietal trials."

The report did not include weather data for the 1992-93 crop season. Since rainfall, temperatures and humidities can affect drought stress, climatic variability can effect plant growth and perhaps also the ranking of wheat and barley yields. Climatic data for each year at each site needs to be included in the report.

Soil water contents were not included in the annual report. Water contents of the upper 30 cm before planting were 18% at Thatta and 18.2% at Dokri; after harvest the corresponding water contents were 11.5 and 10.4%. The absence of water contents was a concern. I began to probe this concern by asking what they believed the mechanism was for varietal differences in drought tolerance. They believe the rooting characteristics of varieties can vary; that those with the most extensive root system would be able to extract the most soil water. It follows that the distribution of soil water content with depth could be an indicator of root activity, and thereby also an indicator of drought tolerance.

But the amount of work required to measure soil water contents for each variety tested during the "preliminary row trials" would excessive. Consequently the suggestion I made during our discussions, to measure soil water contents at several depths to a depth of 90 cm, was not realistic. The suggestion is more appropriate for the "varietal trial" stage of this project.

The soil salinity data they were able to show me indicates the soils are nonsaline. This is consistent with the low salinity of the irrigation water used for paddy rice which is grown in the plot area during the summer. Selection for salt tolerance is not a component of this study because no irrigation water is applied which would be essential to provide a salinity stress to differentiate varietal response. Since salinity is not a component in the study, I strongly recommended that references to salinity be deleted from the report with one exception, namely, that the salinity status of the soil to a depth of 90 cm be determined and reported .

The statistical analysis seems questionable. The individual trials were analyzed separately at each site and for each crop. However, the cultural practices were the same for each trial. Also, at both Thatti and Dokri, the individual trials were conducted in neighboring

file name lbost15

plots. I recommended the data be analyzed as a single group. Consequently, in the future when the "ten best" varieties at each location are selected, the same statistical parameters will be used to test the probability that the yields are different.

Soil Fertility: Nitrogen (67 kg/ha) and P2O5 (34 kg/ha) was broadcast on the plot areas. The plots were than tilled and planted.

Objective 2. To test and develop technology (cultural practices) for rice-wheat/barley rotation to study productivity potential of wheat and barley varieties/cultivars identified/developed during the study. Data from at least two years are required before work on this objective can begin. Consequently, no work will be done on this objective before the 1994-95 cropping season.

Objective 3. To compare the socioeconomic potential of new technologies to existing practices. No work will be done on this objective during the time BOSTID funds will be available.

Quality control of data analysis: I noted several cases of identical means in the wheat data set and at least one typo which involved the name of the variety in the list of the best ten varieties. The team needs to double check the basic data set from which the statistical numbers are generated because the likelihood of identical means is small. Also, where two or more tables contain the same data, as was the case for the "ten best" varieties, each table needs to be carefully cross checked with the other.

Finally, the grain harvesting is done by hand. The threshing machine at the Institute is a unrepairable relic, fit only for a museum. In the unlikely event the BOSTID project has money left over, purchase of a new machine should be given priority. Of the unfilled needs among the projects that I am familiar with, my preference would be to buy a machine which can harvest small amounts of grain crops for this group.

SITE VISIT REPORT

BOSTID PROJECT #16

September 18, 1993

Jim Oster

Title: Project 16: Potassium and ammonia dynamics in soil and the implications for fertility management.

P.I. Dr. M. Saleem Akhtar

Project Status:

Considerable progress has been made during the past eight months. Additional equipment has arrived, more soil sites have been characterized and sampled, and most of the laboratory procedures described in the proposal have been started. The "start up" of only one procedure depends on a chemical shipment which has not arrived.

The following sections are numbered as closely as possible to the numbered sections in the METHODOLOGY section of the research proposal.

1. Sampling and soil series characterization: Sixteen sites have be characterized and samples have been obtained from the different soil horizons. The number of soil horizons at each site range from about four to seven. More sites will be sampled, but I doubt the plan to sample and characterize "about 30" dominant soil series will be finished by the end of project funding.

2. Fractionation: Work is completed on soils obtained from 14 sites. The freeze dryer system, a combination of parts made locally and purchased in the U. S. by BOSTID, functions well and the fine and coarse clay fractions from the fourteen sites are ready.

3. Mineral composition: Determination of the composition of the sand and silt fraction using x-ray diffraction is underway, but similar work on the clay fraction has not been started.

4. Mineralogical quantification: Total elemental analysis of the sand and silt fraction is underway: the pressure bomb that exploded during one of the digestion runs has been replaced by the supplier free of charge. Elemental analysis of the clay fraction has begun now that the proper glassware is available.

5-7 These laboratory procedures (see research proposal and the section entitled U. S. Site Visit) will be done in the U. S. during Dr. Aktar's visit at Dr. Dixon's laboratories at Texas A & M.

8. Layer charge density: These determinations cannot be done until the amine compounds containing from 6 to 18 carbon atoms are available. The first shipment contained compounds with 6, 8, 9, 12, 15, and 18 carbon atoms. The second shipment has not arrived: Dr. Aktar checked with someone, by phone, who would have known if the shipment arrived during the last few days.

   The compound with 14 carbon atoms is crucial because with it one can distinguish

between smectite and vermiculite clay minerals. Work will not begin on charge density until this compound is available. Maybe Aktar will need to "hand carry" this compound to Pakistan when he returns form the U. S. See the section entitled U. S. Site Visit.

9. Potassium release from sand and silt fractions has been measured on about six soils.

10. Work has also started on characterizing the quantity/intensity relationship of selected soils.

U. S. Site Visit.

Dr. Aktar plans to visit the U. S. for about four weeks, starting the third week in December. The plan is to spend the first three weeks at Texas A & M. This time will be needed to characterize the structural configuration of sand and silt fractions and to study the mode of weathering using the electron microprobe and high resolution transmission electron microscope that are available for his use in Dr. Dixon's laboratory. The timing is important since the use of these instruments by resident students and researchers is reduced during the Christmas season.

Dr. Aktar also wishes to spend a week with Dr. Sparks at the University of Delaware.

I strongly urged him to write a letter to Dr. Bale immediately setting out his plans, including research and training objectives, and timelines. This was done and the letter was mailed in the U. S. on October 8, 1993.

Consultant Visit:

Dr. Aktar was planning for Dr. Dixon to visit during May of 1994. Again, I recommended a letter detailing objectives and timing be sent to Dr. Bale as soon as possible because it is not too soon to begin this process.

Second Shipment of Chemical Compounds.

I FAXED a message to Yvonne Forsbergh about the missing second shipment. She and I discussed this on Friday, the day before I left Riverside. It is not clear according to my notes whether this shipment is actually on its way, but was clear that she was concerned.

TO: Dr. Noor Ullah

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your proposed itinerary for a January 1994 trip to the US and a copy of the Fourth Quarterly Report Dated September 21, 1993. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for your hospitality and all the chauffeuring during my recent visit to Karachi. I did make connections with SAS in London without any problems even though we were not able to find a SAS agent in Karachi. Please give my best wishes to all the team especially Dr. Mobarik Ahmed who helped me run down my lost packages! The packages were delivered to the Avari Towers in good order around 6:00 PM on the evening of the 30th.

Site Visit Report: September 30, 1993

Project:
#17 - Insect Pest Management in Stored-grain and Rice Crop with Botanical Products

Site Visitor:
Dean M. Anderson
For David Ferro

Current Status of the Research Project:
I was given the Fourth Quarterly Report (September 21, 1993) at the time of our meeting, a copy is attached. The morning discussion of the project was given by Noor Ullah, Mobarik Ahmed and Syed Asim Rehan Kazmi. I was told that there are few silos in Pakistan and most grains are stored outside in 100 kg bags. The best way to ensure that their research will be applied by the producers is to try and find products that the illiterate are familiar with. This thus makes research on natural products extremely important.

A limitation in the acceptance of fumigants by farmers for killing insects is the requirement for an exact time and dosage of the chemical. Improper or low dosages and lack of air tight enclosures are major problems in the use of chemicals in addition to their human toxicity. Phosgene gas is the predominant fumigant presently being used. The preferred method for covering the grain during this treatment is to use polyethylene.

I was shown a video of the current work being conducted on this project. There are 6 objectives in the project (1) Evaluate extracts from new plants that show potential as biological control agents. (2) Evaluate extracts that look good in the laboratory in larger scale "farm" trials. (3) Concentrate research especially on rice (work being conducted by Syed Asim Rehan Kazmi). (4) Work with H.E.J. to determine what chemical extracts, are possible from plants and animals. (5) Screen for chemical toxicity. (6) Standardize chemical preparation procedures. The first three objectives are being conducted by Dr. Ullah's group while the last three depend heavily upon the scientists connected with H.E.J. Up to the present time their involvement has been minimal. This definitely has had an adverse affect on the total project, especially the last three objectives. It did not appear to me that lack of participation was due to anything except a poor allocation of resources on the part of H.E.J. There was no representative from their group at our meeting even though I was told that they had been invited to participate.

Apparently the H.E.J. group has over extended its commitments. The director Dr. Atta-ur-rahman apparently in good faith will promise when in reality, time and resources make it impossible for his team to bring a project to closure as planned.

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Objective 1 is being carried out using standard (begun in 1952) gustatory and olfactory techniques that include treating 1/2 of a filter paper with the chemical and observing the migration of insects within the petri dish. The second stage of this objective involves evaluating if the young are more or less susceptible to the insecticide than are the adults. Treated rice is examined and determinations are made on the F_1 progeny. A life cycle can be examined within 30 d. This part of the objective is conducted on grain stored in bags. These studies are being conducted at two sites. One near Karachi with high temperatures and humidity (polished rice). The other site lies north or Karachi in a region having lower humidity but higher temperatures.

Mr. Kazmi described Objective 3 to me. Up to September 9 it had been too dry to apply field treatments. The rice was transplanted on August 9, 1993. Plots are 12 x 8 m with three reps per treatment laid out in a randomized complete block design. The chemical treatments are being applied with a "knap-sack" sprayer.

Two types of storage treatments are being applied, those to bags and another to directly to the grain. Approximately 1000 micrograms per cm^2 and 500 ppm of active ingredient are the rates of neem extract being applied to bags and the grain, respectively. The bag treatment is being applied to IR-6 variety in 20 kg bags. A total of 16 bags per dunnage (pallet) is the way in which the bags are stored. The rice was purchased from the local market and thus had been treated with phosgene gas prior to the experimental treatments being applied. This rice is polished. A micro Ulva spray was used to apply these treatments, however, the mist was too fine and there was excess wastage. They now have determined that a "windex window spray bottle" works well as an applicator. Wastage must be kept at a minimum since it takes 70 kg of neem seeds to obtain 5 l of oil. With normal techniques there is about a 15% recovery of the oil from neem seeds. Two commercially available products using neem are Cuprex (a dust produced by Welcome) and Neem Bond A (produced in Thailand).

Project Responsibilities:
The change of PI's from Dr. Ghulam Jilani to Dr. Noor Ullah on May 31, 1993 took place with no apparent changes to the research program that were brought to my attention.

Problems:
The only point that was brought to my attention was that the H.E.J. Research Institute of Chemistry appears to be behind in holding up there end of the research not because of disinterest but because of over extended commitments on the part of the staff. They promised to have 4 new plant and 1 animal extract in quantities adequate for field testing, this has not happened. Out of 5 new plants H.E.J. was given they have returned only 2. During my visit it was suggested that the work that needs to be done for this project be assigned to a Ph. D. candidate. This would not only serve

as his research topic but would accomplish the needs of project # 17. I encouraged Dr. Ullah and his team to pursue this idea with H.E.J.

Yvonne Forsbergh's July 25, 1993 report indicated that the environmental chambers for rearing insects were not operating properly. This still remains a problem and will not be corrected in light of the monetary commitments already made in this project.

What suggestions/recommendations did you make:

1) for next stage of project--action and time

No specific research recommendations were made except those related to the preparation of manuscript(s) for the May 1994 conference.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to Dr. Ferro each time for review.

The proposed journals (they have the style manuals) would be Journal of Stored Product Research (Penguin Press) for articles 2 and 3 below and Tropical Sciences (WHURR Publishers LTD.) for article 1 below. Dr. Ullah believes they can have a minimum of three manuscripts ready by the first week of January 1994. The three proposed titles would be (1) Field evaluation of plant products against rice crop insects. (2) Evaluation of botanical products against insect pests of stored rice under farm conditions. (3) Laboratory evaluations of biological extracts against stored grain insects. I suggested to Dr. Ullah the deadline format for reviews I have asked my 5 projects to follow. The basic outline of events are as follows:

WEEK OF DECEMBER 12TH
Receive one or more manuscripts on from Pakistan.

WEEK OF JANUARY 15TH
Return manuscript(s) back to Pakistan with suggestions and corrections .

WEEK OF MARCH 8TH
Receive the revised manuscript(s) and send out to four reviewers with the requirement that reviews must be back in Dr. Ferro's office on or before March 31.

WEEK OF APRIL 1ST
Return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST
Authors will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?
Preparation of manuscripts to be presented at the May 1994 conference.

Other topics, if discussed:

U.S. Research Visits:
A copy of a proposed itinerary prepared by Dr. Ullah to begin in January 1994 is attached.

Consultant Visits:
None proposed

Equipment:
Apparently there continues to be a problem in receipt of equipment. Apparently the equipment is in Pakistan, but they are not sure where it is, probably Islamabad. I encouraged them to call Dr. Umar Khan Baloch while I was there and ask; however, I do not believe they were able to get through and so I can not report further on this subject. The current equipment remains incomplete; therefore, equipment exists as parts not whole complete working units. They commented that they had just received Yvonne Forsbergh's letter dated September 24. I was told that if all of their equipment had arrived the "hold up" caused by H.E.J. would have not been a problem since they could have produced an adequate amount of "chemicals" on their own without the help of H.E.J.

Payments/Financial:
Apparently some of the monies allocated to H.E.J. have not been received by them and this is tied into the reports being approved. As I understood the situation project 17 needs to satisfy people in the Pakistan Government's Account Department. Only after these people have been told that the year's reports are adequate and are approved will the Rs be released. This apparently awaits action by BOSTID.

Items to Send:
None discussed

SITE VISIT REPORT

BOSTID PROJECT #21

September 21, 1993

Jim Oster

Title: Developing a fertility management system for eroded lands.

P.I. Dr. A. Bhatti

Objective 1: to determine the changes in soil properties due to past erosion which are responsible for loss in crop yield. This phase of the project is finished and summarized in the Annual Report.

Objective 2: to identify limiting factors of crop production of these eroded lands. The 1992 - 93 wheat yields were not significantly correlated with any of the soil properties measured. Different criteria were developed by selecting cut off levels from the frequency distributions of various soil properties and wheat yields. Using lime content, three management units were identified with significantly different values of lime content, soil pH, silt content, and crop yield; however, significantly different values were not obtained for organic matter, soil fertility (phosphorus, potassium, and zinc), and clay and sand content.

Objective 3: to develop efficient fertility management strategies to restore productivity of eroded lands. We discussed several ways to establish the plot plan for the 1993-94 crop year.

I encouraged Dr. Bhatti to write a paper that addressed the use of geostatistical techniques for setting up field experiments which can address two objectives: 1) to determine optimum fertilizer rates, and 2) to demonstrate the utility of fertilizer usage to farmers.

file name Lbost21

SITE VISIT REPORT

BOSTID PROJECT #22

September 22, 1993

Jim Oster

Title: Crop management practices for improving crop productivity and soil fertility on marginal lands.

P.I. Dr. M. Hatam

Objective 1: to determine an optimum rate and method of N and P fertilizer application to wheat and chickpea. Yields increased for both crops at all rates (23 and 46 kg/ha) of either N or P applied alone or together. This indicates the maximum rate used for both nutrients was inadequate to maximize yield. Consequently, an optimum rate based on crop response and economic factors cannot be determined for the 1993-94 experiments.

The increased yields with N fertilizer obtained with chickpea indicates nitrogen fixation by the crop was not effective in providing the nitrogen needs of the crop.

The analysis of variance will be done by Dr. M. Jamal and will be completed by September 30.

The team is considering changing the experimental design for the 1993 - 94 crop season. The previous plan was to use only one fertilizer rate corresponding the optimum rate determined in the 1992-93 cropping season. A fully replicated trial using fertilizer rates of 0, 46, and from 70 to 90 kg/ha (the range for the third rate indicates what the team is considering) is being considered because the 1992-93 results indicate that higher rates may further increase yields. A trial with higher rates increases the chances that optimum rates can be determined. The 1993-94 crop season includes additional work to do residual fertilizer studies not done in the 1992-93. Consequently, the team will need to carefully assess if adequate labor is available. If it is, I encouraged them to include a third, higher fertilizer rate.

Objective 2: to quantify the effect of organic manure on the productivity of wheat and chickpea. With one exception, application of 10 tons/ha of manure decreased crop yields. The team may be able to explain the results based on the composition of the manure. This data has not been reported, but the team was confident the data was being obtained.

Based on the data obtained in the inorganic fertilizer experiments, application of manure should have resulted in a yield increase. Manure contains phosphorus and potassium in addition to nitrogen. Yield increases due to nitrogen may have been repressed due to a high C/N of the manure. However, the phosphorus in the manure should have resulted in a yield increase based on the data obtained in the inorganic fertilizer trials. Yield increases due to the potassium in the manure was also a possibility. Consequently, the yield reductions resulting from manure application indicates the addition of manure severely decreased the availability of nitrogen. If so, the residual fertilizer experiments in the 1993-94 season, to be conducted on lands to which manure was applied in 1992, may result in increased crop yields due to the delayed release of nitrogen previously incorporated into the soil biota.

file name lbost22.rpt

The team has obtained fresher supplies of manure than those used in the 1992-93 season for use in the 1993-94 season in the hopes of using manure that contains higher levels of nitrogen.

Objective 3: to determine the most suitable combination of organic and inorganic N and P fertilizers for maximum sustainable yields. Data obtained during the 1993-94 season will be crucial to fulfill this objective.

Objective 4: to determine the effect of crop rotations on crop yield and soil fertility for prolonged sustainable agriculture. The same comment made to objective 3 applies to this objective also.

COMMITMENTS:

I will provide a list of literature published about N, P and K fertilization of wheat and chickpea. I plan to ask the reference librarian for a computer literature search and will send Dr. Mir Hatam the resulting computer printout.

PROBLEM:

The last payment has not been received. Hatam doesn't know why there has been a delay.

Revision received from P.I. on 11/6/93 regarding change in project design after site visit:

The design is changed and instead of only one rate of manure (10 t/ha) now 0, 10 and 20 t/ha of manure is used as main plots both for wheat and chickpea. Superimposed upon this are four rates of NP that is 0, 46, 69 and 92 kg N and P_2O_5/ha as sub plots.

file name lbost22.rpt

SITE VISIT REPORT

BOSTID PROJECT #23

September 23, 1993

Jim Oster

Title: Control Strategies of Maydis Leaf Blight of Maize

P.I. Dr. Shabeer Ahmad

Objective 1: to develop an integrated control model of Maydis leaf blight of maize in NWFP. Large fields (0.5 - 1 ha) are planted with five inoculated varieties and treated with two fungicides and a rate of 2.2 kg(ai)/ha. This work is being done at four sites. Treatment effects are evident in the 1993. This portion of the work was unsuccessful in 1992 because the unusually warm weather reduced the development of leaf blight.

The fields are large so that treatment effects are more easily seen and understandable. However, no plans are being made to have "field days" to show the experiment to local farmers. My encouragement to do so seemed to generate a small degree of bemusement, although the PI's did admit the cost would not be great.

Objective 2: to identify the sources of resistance to Maydis leaf blight of maize. The differences among varieties was striking at the Peshawar experimental farm.

General comments:

1. It took almost two hours to present the data the team had obtained and organized. I mentioned the possibility of writing a paper and to have it reviewed by their research colleagues in CYMMYT and elsewhere. However, it is unlikely all the data will be summarized by early December, as would be necessary if a paper was to be written by January 1.

2. The team is well trained and the cooperation with Dr. Mohammad Saleem, Maize breeder, appears to be excellent.

3. Corn varieties with tropical ancestry seem to be more resistant that varieties developed in cooler climates.

4. Interest in Extension work is nil. It seems that farmers interested in applicable applied research will have to read about it, or visit local experiment stations on their own.

Future needs:

1. $5000 to $10,000 per year needed after BOSTID funding ends to continue the work.

2. A computer. Dr. Shabeer Ahmad says he has responded, in writing, to Dr. Bale's last letter requesting detailed budget information. According to Ahmad, there are sufficient project funds available, due to "savings," to buy a computer locally. He wasn't concerned about the situation and left the impression that Dr. Bale will receive soon the necessary information.

file name lbost23

3. Foreign travel. Members of the team would like to visit CIMMYT in Bangkok and a maize researcher in Java, Indonesia. I didn't hold out any hope that the necessary approval could be obtained in the time remaining even if "savings" were adequate to cover the travel costs. I did mention that a letter to Dr. Bale, giving objectives and travel details, would be required to start the process of obtaining approval.

I did not get the impression that any member of the team had given this much thought. There was no mention of a research conference that could be attended, nor was there any mention of details in regard to when such a visit would best benefit the project, or when it would be a good time to visit from the viewpoint of the host scientists to be visited.

file name fbost23

TO: Dr. Dr. Akhtar Nawaz Khan

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale is your Progress Report dated September 15, 1993, an outline of experiments 1993-94, and the most recent style manual for the Agronomy Journal with selected examples. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for a most informative discussion on your research. The order and cleanness of your lab impressed me. I do hope you will push ahead with your research in spite of the delays in getting your flame photometer installed. Please extend greetings to all of your team for me.

Site Visit Report: September 22, 1993

Project:
#25 - Selection of Cotton Varieties Tolerant to Salinity

Site Visitor:
Dean M. Anderson
For Bill Rains

Current Status of the Research Project:
Met with Dr. Khan and associates to be briefed on the project. I was given the September 15, 1993 progress report (see attached) along with a tour of the laboratory facilities and the hydroponic experiment involved in growing cotton in Hoagland's solution with various levels of salinity. I was told that they had run 4 hydroponic experiments since May 1993 and that by December/January the field experiments that were planted in June will be harvested. Apparently the methodologies used in the hydroponic experiments have not been the same over all five experiments run in 1992 and 1993 (5 using old methodology and 2 using the new methodology). Of the four hydroponic experiments run in 1993, two were run in each of the two methodologies. I commented that this change in protocol must be considered in the statistical model used to analyze these data for the final report.

I was told that the laboratory trials consisted of 5 reps. At the end of 15 days fresh weights are obtained followed by complete separation of roots and shoots. The separated material is dried to constant weight at 65 to 70 C. The mass/plant by shoot and root is calculated as are the lengths of shoots and roots. The dried material is then ground for Na and K analysis. Here is where the flame photometer is needed. Dr. Khan plans to borrow Dr. Mianna's unit if his is not installed and operational very soon.

I was not taken to the field plots since the plots were located in an area that would have jeopardized my safety according to Dr. Khan. However, the field experiment was discussed in the laboratory. I was told that in the field plots there was not a control since the soils were naturally salty and that the hetrogenity of soil salinity made it possible to evaluate differences among the cotton cultivars. The cotton is picked and an air dry weight is obtained along with plant height. Leaves, stems and seed cotton masses are obtained. The cotton is picked 3 to 4 times due to differences in rate of maturity before the plant itself is harvested. Heights are obtained by measuring from the soil surface to the terminal shoot. Ten plants are harvested to determine height while all other parameters are based on data from 24 plants. In the field there are 2 rows per treatment. The leaf and stem mass of the field grown plants is determined on a "sun" dried basis and this is determined when the plant stems are dry enough to break when bent.

Project Responsibilities:
No apparent changes were mentioned to have occurred since January 1993 based on the reports I had available to read and none were brought to my attention.

Problems:
Lack of the flame photometer's instillation has prevented work from being completed on time. I was told that between 10 and 20 days will be required to run the samples which await processing if 50 to 60 samples can be run per day. I was told that data were lost due to equipment failure due to lack of the air conditioner to lower ambient temperatures during both 1992 and 1993 in the period July through August.

What suggestions/recommendations did you make:

1) for next stage of project--action and time
I strongly encouraged that a dialogue be established between Dr. Rafiq Ahmad, Principal Investigator of the Biosaline Research Project at the University of Karachi and Dr. Khan. Dr. Khan was aware of Dr. Ahmad's work and had a poster which cited some of his research but I did not get the impression that these two scientists were cooperating in any fashion at the present time even though one of Dr Ahmad's technicians had recently stopped in during a collecting trip to the D.I. Khan area. I suggested that Dr. Ahmad would be an appropriate reviewer for the upcoming manuscript to be prepared for the May 1994 conference.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to Dr. Rains each time for review. Dr. Khan does not have this capability but believes he can obtain this word processing package through Gomal University Computer Center.

Dr. Khan indicated that he would like to try and publish his data in the Agronomy Journal. He plans to submit one manuscript based on 2 years of data entitled "Selection of cotton cultivars for salinity tolerance". He felt that this manuscript could be sent to Dr. Rains during the week of January 21, 1994.

I suggested to Dr. Khan that he follow the deadline format for reviews I have asked my 5 projects to follow. The basic outline of events are as follows:

WEEK OF DECEMBER 12TH
Receive one or more manuscripts on from Pakistan.

WEEK OF JANUARY 15TH
Return manuscript(s) back to Pakistan with suggestions and corrections .

WEEK OF MARCH 8TH
Receive the revised manuscript(s) and send out to four reviewers with the requirement that reviews must be back in Dr. Rain's office on or before March 31.

WEEK OF APRIL 1ST
Return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST
Authors will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

2) for solving problems

What is to be accomplished by the next site visit in May 1994?

Other topics, if discussed:

U.S. Research Visits:
None discussed

Consultant Visits:
None proposed

Equipment:
There continues to be a problem in getting the Beckman Flame Photometer installed and an air conditioned room necessary for the equipment. Evidently Beckman does not have a representative in Pakistan and thus the units awaits instillation. A company (Noor PTE Limited) in Lahore Pakistan indicated in a letter to Dr. Khan dated July 13, 1993 (Ref.: M-089) it would cost 10,000 Rs to install the equipment. This was of concern not only because of the high cost but also for warranty requirements. Dr. Khan referred to a letter dated 7-31-93 which was sent to Dr. Bale explaining the problems. He was concerned that no action has yet been taken. I indicated that I would bring this to Dr. Bales attention in my site visit report.

Dr. Khan is still using a borrowed air compressor to aerate their hydroponic culture experiment. In my opinion the borrowed air compressor appears old and unreliable and though working when I visited appears minimally adequate. Therefore, their request for an adequate air compressor appears absolutely essential. Evidently the air compressor and air conditioner arrived in Pakistan damaged (7-6-93) but Dr. Khan did not know who judged the units to be damaged. Dr. Khan also wondered if $792.24 still in the equipment budget could be applied to a computer? I could not answer this question but indicated that I would include it in my site visit report.

Payments/Financial:
None discussed

Items to Send:
Dr. Khan requested the current style manual for the Agronomy Journal which is attached. Dr. Khan also indicated that he needs literature since 1986-87. He told me that Dr. Maas (U.S. Salinity Lab, Riverside California) had sent him earlier literature and he requested that if possible he be updated on literature dealing with screening techniques, and literature on salt tolerance plants especially those belonging to the cotton family. Dr. Khan plans to go to Islamabad in October 1993 to search through their available literature and references. I indicated this would be included in my site visit report since I was not familiar with the literature I could not help him on this.

TO: Dr. Dr. Fatah Khan

FROM: Dean M. Anderson

DATE: October 22, 1993

SUBJECT: September 1993 Site Visit Report

Included with my site visit report to Dr. Bale are some forms I have used in the field when recording diet/behavior data. Please feel free to modify them in any way which might be of value to you. Also I have included the statistical analysis as outlined by Dr. Leigh Murray. If I recorded information incorrectly in my site visit report please let me know and I will make the appropriate changes.

Thank you again for the extra special hospitality you showed to me while I was in Islamabad. I again enjoyed dinner in your home and I thank you and your family for the very nice evening. Please give my best wishes to Nasir, Dr. Nuthani and all the team and a special greeting to Dr. Umar Khan Baloch for all his arrangements made on my behalf. I sure did appreciate his hospitality, the delicious meal and the fellowship we all enjoyed in his home.

Site Visit Report: September 18, 21 & 24, 1993

Project:
#26 - Manipulation of Dera Ghazi Khan Rangeland to Improve the Productivity of Local Livestock

Site Visitor:
Dean M. Anderson

Current Status of the Research Project:
The project is now focused 100% on an area to the west of Taunsa, Pakistan approximately 75 U.S. miles (2 hours 15 min) to the south-west of D. I. Khan. The second site (Rakh Bibi) has been abandoned because of similarities of vegetation and socio-economic conditions to the Taunsa site. On September 18 and 21 we met at NARC facilities in Islamabad. At 10:10 AM on September 18, 1993 an earth quake disrupted our discussions, the table began moving, and we left the concrete building until the shaking stopped!

The discussion With Drs. Khan and Butt in Islamabad centered mainly on vegetation sampling. I suggested the vegetation data be represented as means with standard errors on an x-y (year-kg/ha) histogram. At each of the ten locations along the 100 m line data is being collected by species. This will allow percent composition of the area to be determined by species and by location. For 1992 the data includes end of season harvest (kg/ha) by species and frequency by species in addition to a proximate analysis by species. I suggested that the species composition by quadrant location may indicate how differences in micro relief, probably a moisture/temperature interaction, may be influencing the species found. This way of examining the data may be possible if the quadrats are grouped based on micro-relief. However, after having traveled to the site on 24 September I do not believe that the topography is that different within the area such that the sampling procedure being used would pick up any subtle differences, if in fact they do exist. Therefore, breaking the line into "groups" would probably not contribute information as to the variability of species encountered along the 100 m line. The remainder of the time in Islamabad was spent discussing the schedule for publication of results.

On the afternoon of September 24, 1993 Fatah and I were driven to the Taunsa research site. It lies approximately 8 miles to the west of Taunsa. The round trip from D. I. Khan to Taunsa with the on site review took 7 hours and 15 minutes. I was told there was a mountain range to the west of the research site, however, the relatively still air was so filled with a red dust that I could look directly toward the sun without having to squint and thus did not see the mountains! The soils appear to be a loess with a gypsum layer 4 to 5 feet below the surface. The predominant wind direction is north to south and appears to be quite frequent and severe due to the pedestalled and exposed crowns of the bunch grasses. At the present time the

personnel at Taunsa are under the guidance of Dr. M. Ishal Khan Nuthani veterinary officer in charge. He conducted the tour along with Mian Zahoor Ahmed S.D.F.O. Range Management Division Dera Ghazi Khan.

I learned that 1993 has been very dry and thus little if any grass has grown at Taunsa. The reseeded area is approximately 700 ha. Vegetation data is presently being collected monthly at Taunsa, this clipping frequency only began on August 13, 1993 and will continue for the duration of the project. Clipping in 1992 occurred only in November at the end of the growing season.

Currently vegetation sampling is conducted along a single 100 m line in each of the three treatments. Ten quadrats per line, each 1 m^2 in size are clipped. The frame is located by "throwing it 'somewhere' within a 180° arc in front of the direction of travel". This was and continues to be of concern to me since the current way data is being taken requires that each quadrant be considered an experimental unit in an analysis and this is not accurate. Before seeing the area I was extremely concerned. However, after seeing the area on September 24 my concern about topographical heterogeneity was lessened, however, I strongly encouraged additional lines be sampled in each treatment if this is possible within the labor and economic constraints under which this project is operating. With more lines an adequate number of experimental units will result eliminating the present situation of pseudo-replication .

In 1993 clipping began on a monthly schedule in June and was continued in August, September with scheduled clippings to be done in October and November. Because of this periodic clipping in 1993 determination of a growth rate will be possible. With the November clipping a second year of data concerning end of season growth will be available for inclusion in the manuscript to be prepared.

Livestock data has been gathered monthly since November 1992. At present there are 35 sheep and 33 goats on the project. The Damani sheep are raised for their milk, the Buchi breed have a black face and are duel purpose. The Dasi goat is a local long hair breed and the Sind desi has short hair and curly horns.

Availability of seeds appears to have dictated the mix of the various seed mixtures originally used in the reseeding treatment. In 1991, 1992 and 1993 the seed mix was 80% *Cenchrus ciliaris* (Dhaman) and 20% *Lasiurus sindicus* (Gorkha). Seeding is done by hand broadcasting followed by covering the seeds with 1 to 2 cm of soil by dragging a plank over the surface. Even though there is no irrigation water tube wells only need to be dug to 130′ to obtain water suitable for livestock use.

Dhaman is more preferred by the sheep and goats, and during growth has a CP value of 9% while Gorkha is more coarse, marginal serrations on the leaves are like those of sorghum. The presence of serrations may help to explain why Gorkha is less preferred by the livestock than is Dhaman.

Gorkha roots grow to a greater depth than does the Dhaman and thus appears to withstand drought better than Dhaman. Other grasses include Chimber *Eleusine flagellifera* which forms stolons and looks much like our burrograss *Scleropogon brevifolius*. The woody shrub Lana *Haloxylon ialicornuim* was quite bitter to my taste. I was told it is only browsed by camels.

There are three vegetation treatments at Taunsa: native vegetation, an area seeded two years ago and another area seeded last year. The initial seeding was done by the Punjab Forestry Department in 1991, in 1992 40% of the area was reseeded due to poor seedling establishment. Labor costs to sample the vegetation in these areas has increased 100% since the initiation of the project due to inflation.

Project Responsibilities:

No apparent changes were observed since January 1993 and none were brought to my attention.

Problems:
None were brought to my attention.

What suggestions/recommendations did you make:

1) for next stage of project--action and <u>time</u>

I will ask Dr. Leigh Murray at New Mexico State University to critique the following procedure for sampling livestock dietary preference for statistical accuracy. In addition I will ask her to provide an outline of the model to be used in the analysis (see attached). This procedure should be implemented immediately, November 1993, in the sampling of livestock diets and behavior.

PROPOSED SAMPLING PROCEDURE FOR DETERMINING THE DIETARY PREFERENCE OF FREE RANGING LIVESTOCK ON DERA GHAZI KHAN RANGELAND

OBJECTIVE:

TO DETERMINE THE TEMPORAL BEHAVIORAL PROFILE OF EWES AND NANNIES BY OBSERVING THEIR ACTIVITIES DURING DAYLIGHT TO INCLUDE FORAGING BY SPECIES AND NON-FORAGING ACTIVITIES INCLUDING WALKING, LYING, STANDING, RUMINATING, DEFECATION, URINATION AND DRINKING

NUMBER OF OBSERVERS:
2 (A SHEEP EXPERT AND A GOAT EXPERT EACH WATCHING THEIR SPECIES, RESPECTIVELY)

ANIMALS TO BE OBSERVED:
SPECIES - 2 (EWES AND NANNIES)
NUMBER OF ANIMALS WITHIN A SPECIES - 10 (TOTAL NUMBER OF SHEEP = 34 AND GOATS = 32; ANIMALS TO BE OBSERVED CHOSEN FOR UNIFORMITY OF SIZE, WEIGHT AGE ETC.)

SAMPLING PERIODS:
PROPOSED FOR MID- TO LATE IN THE MONTH COLLECTIONS TO CONTINUE OVER SEVERAL CONSECUTIVE MONTHS (SEASONS)

CONSECUTIVE DAYS WITHIN MONTHS:
6 (3 AM AND 3 PM PERIODS WILL BE RANDOMLY ASSIGNED ACROSS THE 6 CONSECUTIVE DAYS)

TIMES OF DAY:
2 (AM, 0700 TO 1100 HRS & 1500 TO 1800 HOURS)

SAMPLING TIME PER ANIMAL:
(THE FIRST ANIMAL CHOSEN TO BE OBSERVED IS THAT ANIMAL WHICH IS JUDGED TO BE FORAGING CLOSEST TO THE CENTER OF THE SPECIES GROUP. FOR MORNING OBSERVATIONS THIS SELECTION OCCURS 30 MINUTES FOLLOWING THEIR RELEASE, DURING AFTERNOON OBSERVATIONS THE ANIMALS WILL ALREADY BE AT PASTURE AND NO ADJUSTMENT TIME WILL BE REQUIRED)

OBSERVATIONS:
1 PER MINUTE
CONSECUTIVE OBSERVATIONS PER RUN - 5 (EACH ANIMAL IS OBSERVED FOR 5 CONSECUTIVE MINUTES BEFORE THE NEXT CLOSEST ANIMAL IS SUBSEQUENTLY OBSERVED)

PROPOSED MODEL WILL CONTAIN THE FOLLOWING:
1 OBSERVER/ANIMAL SPP. X 2 SPP (EWES & NANNIES). X 10 ANIMALS/SPP. X 1 OBS./MIN X 5 MIN/RUN X 3 RUNS/TIME OF DAY (AM OR PM) X 2 TIMES OF DAY X 3 DAYS/TRIAL = 1800 OBSERVATIONS/MONTH

NOTE:
For the sake of this analysis you will consider that there are only two treatments, a native area and a seeded area. Remember I indicated that the area seeded only once should be considered a separate treatment from that reseeded twice. After visiting with Leigh about "three" treatments she believes that for the animal data you can consider just two treatments. You decide where the diets of the animals should be taken, on the area seeded once or twice. Once you make this decision then **always** take the diet/behavior data on that area. I would suggest that you use the area that most closely approximates the density of vegetation found under the natural range conditions. My reason for making this suggestion is that you are then giving the animals the same opportunity to walk in both instances. If the density is quite different between the two treatments this might substantially increase the amount of walking in the treatment having the least dense vegetation. Also be sure that you are watching the same animals when you sample both areas and obviously assign the native and seeded areas randomly within the month. This design assumes you complete **all** observations within an area (native or seeded) before proceeding to the next area.

The following is from Dr. Leigh Murray.
This model will run using SAS GLM **only if there are NO missing cells.** Make sure that for each minute and animal is being observed that there is data, a numerical code of some activity or species being eaten.

SOURCE	df
Species	1
Animal (Species)*	2(10-1) = 18
Treatment (native vs seeded)	1
Spp. x Treat.	1
Treat. x Anim.(Spp.)	18
Month	1
Month x Spp.	1
Month x Anim.(Spp.)	18
Month x Treat.	1
Month x Spp. x Treat.	1
Month x Treat. x Anim.(Spp.) error term	18

* Test this only if you are interested in the significance of animal(spp) variance component. Since we know there is animal to animal variability you may not want to go to the bother to calculate Salterhwaite's approximation for testing differences among animals. Another option is to use a conditional F-test indicated by the dotted lines. All other testing is valid and indicated by the solid lines.

2) for solving problems

I had a question concerning the compatibility of vegetation sampling for production (kg/ha) where livestock were also being stocked. Dr. Khan assured me that the herders have and will continue to restrict the sheep and goats from foraging near the sampling lines so the production figures will be expressed under non-stocking. This will be brought out in the Materials and Methods section of the manuscript. Because the amount of data that will be available by December 31, 1993, an ending time that is realistic for preparation of a manuscript, I believe the following procedure should be followed. Prepare a manuscript in the proper style and format appropriate for the subject matter and have it reviewed in like manner. For Project #26 it will be for the Journal of Range Management. Since there is not an adequate amount of data for acceptance in the journal at this time it should be published in a proceedings. I was told that PARC plans to support this research past May 1994. Hopefully this will occur and when additional data (replication over time) is available it can easily be incorporated into the Results, Discussion and Conclusion sections of the manuscript which will be published in the proceedings. At this time the manuscript can be resubmitted for reviews and submitted to the JRM for publication. It is my strong belief that the science is good and that the only thing that would hold it back from being published in the JRM is inadequate replication which can be overcome only by more years of data. It is on this basis that I recommend that BOSTID and PARC give serious consideration to a Proceedings to make it possible that all work under this project be available in one publication that can be cited.

What is to be accomplished by the next site visit in May 1994?
The next visit will be a conference and individual reports on each project to be held in Islamabad in May 1994 as USAID funding is presently scheduled to terminate at this time.

PROPOSED REVIEW SCHEDULE

Each manuscript will be typed using WordPerfect, using a version (5.1 or newer) having the "Columns/Table Feature" (Alt F7). Both a hard copy and a 3 1/2" disk should be sent to the US each time for review.

We discussed referred journals that would be appropriate in which to publish the findings of this project. The following journals were discussed: Pakistan Journal of Agricultural Research, Journal of Forestry, Annals of the Arid Zone (an Indian journal I am not familiar with), Tropical Science, Tropical Agriculture and Journal of Range Management. It was decided upon to use the style of the JRM and I left a copy of the November 1, 1991 style manual for Dr. Khan and Butt. The following schedule was jointly developed between myself, Khan and Butt to assure that a manuscript will be ready for the May 1994 deadline.

WEEK OF NOVEMBER 21ST
Drs. Khan and Butt will send Introduction, Materials and Methods and Literature Cited section to Dean Anderson in Las Cruces.

WEEK OF DECEMBER 12TH
Dean Anderson will return corrections and suggestions to Pakistan.

WEEK OF JANUARY 15TH
Drs. Khan and Butt will send completed manuscript with tables and figures and the corrected Introduction, Materials and Methods and Literature Cited to Las Cruces.

WEEK OF FEBRUARY 15TH
Dean Anderson will return corrections and suggestions on complete manuscript back to Pakistan.

WEEK OF MARCH 8TH
Drs. Khan and Butt will send revised completed manuscript back to Las Cruces. At this point Dean Anderson will send the manuscript out to four reviewers with the requirement that reviews must be back in Las Cruces on or before March 31.

WEEK OF APRIL 1ST
Dean Anderson will return a minimum of three reviews to Pakistan.

WEEK OF MAY 1ST
Drs. Khan and Butt will work with Dr. Umar Khan Baloch in preparing their manuscript for the Proceedings to be available at the time of the May conference.

Other topics, if discussed:

U.S. Research Visits:
None discussed

Consultant Visits:
Dr. Bobby Stewart was unable to visit this project in February 1993 due to complicated flight connections arising from bad weather.

Equipment:
There is an urgent need for one or two motorized vehicles to get the technicians from Taunsa to the field. The topography is relatively flat but very sandy. I would suggest a 3 or 4 wheel all terrain vehicle like the Suzuki Quadrunner 4WD. I was told that without this type of transportation the technicians must walk.

Payments/Financial:
I delivered the letter from BOSTID to Dr. Khan as directed by Dr. Bale concerning financial accounting matters. No other items were discussed.

Items to Send:
I will send Dr. Khan some examples of forms I have used on the Jornada to record similar observation data. In addition, comments from Dr. Leigh Murray concerning sampling will be sent with this site report.

SITE VISIT REPORT

BOSTID PROJECT #27

September 26, 1993

Jim Oster

Title: Development and transfer of farming systems for the Rod-Kohi area.

The primary objective of this visit was to see the possible field sites for the 1993-94 crop season. The Rod-Kohi region near D. I Khan received a limited amount of flood waters one month earlier than expected. Only a few farmers had the diversion dams in place. Luckily, one of these farmers was a cooperator for the 1993-94 season. This farmer's field will be the only site where the tillage treatments done in 1992-93 will be repeated in 1993-94. We visited this field site and met the farmer.

I also met with Khan's staff and discussed with them the importance of double checking the data. The water content data in last year's report is suspect. The distribution of water contents with depth is erratic. In several cases a low water content is reported for a soil layer where the layers immediately above and below this layer are reported to have much higher water contents.

Dr. Bhatti, the PI of project number #21 and a former student of Dr. Khan, also questioned the water content data. Dr. Bhatti has agreed to spend a week or more in D. I. Khan to review the data and the statistical techniques used to analyze the data. This visit is planned to occur in the latter part of October or early November 1993. I have strongly encouraged both Bhatti and Khan to collaborate closely.

Dr. Alan Stapleton, Soil Physicist with Hunting Technical Services LTD and currently stationed at the Land Resources Research Institute of NARC in Islamabad, has also agreed to work with Khan. Stapleton is working on a project funded by the World Bank. He and I discussed Khan's project while I was at NARC on Sept. 17.

There is some Extension work going on in relation to this project. Dr. Khan has been in contact with the farmers who live near where he conducted the field research in 1992-93. He has told them about financing available through the government to purchase seed, fertilizer and etc. According the Dr. Khan, the farmers were receptive to his ideas because of the results he obtained with the improved wheat variety during 1992-93. I encouraged him to expand this work.

PROJECT OBJECTIVES

I didn't review the specific objectives of this project with Dr. Khan. He is knowledgeable about local resources, land capability, irrigation availability, crop and fodder germplasm (Obj. 1). Field work related to the other objectives (2 - 5) has been started.

OUTLOOK

The results from the field experiments will be meager because of the erratic nature of the irrigation system. The 1992-93 results with the improved variety of wheat were convincing to several local farmers. Whether the different tillage methods affected wheat yields in 1992 - 93 is not currently known. Maybe after a careful review of the data and with proper statistical analysis it can be shown that the differences in yield that were obtained were significant. Improvements in experimental layout of the tillage treatments, in determining

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the rooting distribution with depth, and in measuring soil water contents were being planned for the 1993-94 season. But, because of the early flooding, work will only be done on one field.

The impacts on local farmers may be greater with this project than with others on my list. Dr. Khan has tried to help the local farmers. I expect efforts in this regard will increase.

In summary, although there are problems with the data analysis, and with mother nature's supply of irrigation water, the little information obtained has been combined with other information which farmers can use, and Dr. Khan has personally delivered it to the local farmers.

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BOSTID / PARC
GRANT No. PAK-CS-NW-27
Faculty of Agriculture
Gomal University.
D. I. Khan, Pakistan.

PROJECT :
Development & Transfer of Farming System in Rod-Kohi Areas.

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بسم الله الرحمن الرحيم

Ref: No. FA/GU/NAS/Grants/84-85

Dated November 4, 1993

Dr. Judith Bale,
Co-Director,
Pakistan Research Program,
2101 Constitution Avenue,
Washington DC 20418, USA.

SITE VISIT REPORT

Dear Dr. Bale,

Please refer to the Site Visit Report dated September 26, 1993, para 2nd and 3rd.

In light of the comments, the data was checked thoroughly. The discrepancy was noted with concern. It was due to wrong feeding of data in the computer by the staff member that erratic figures in the Table II.11.1 and III.11.2 were reported.

The concerned tables have been corrected accordingly <copy attached>. Please send the same to Dr. James Oster.

As required in the report, Dr. Bhatti visited D. I. Khan and we discussed the techniques used for analyzing the data. He suggested few other parameters for the collection of future data and its analysis.

Thanks.

With best wishes.

Sincerely yours

(Prof. Dr. Hamid Ullah Khan)

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WHEAT

TABLE III.11.1 Moisture (%) with Different Treatments in Wheat Crop Area.

Dated: 5/5/1993

Depth (cm)	Cultivator	Mold Board Plough	Disc Plough	Chisel Plough
0-10	4.4 %	1.9 %	1.1 %	1.1 %
10-20	8.6 %	4.1 %	4.1 %	2.0 %
20-30	10.3 %	7.3 %	4.0 %	1.6 %
30-40	9.2 %	4.5 %	4.7 %	1.8 %
40-50	8.2 %	2.5 %	4.5 %	2.7 %
50-60	6.7 %	1.6 %	6.0 %	2.0 %
60-70	9.2 %	2.5 %	6.7 %	2.9 %
70-80	4.0 %	3.0 %	7.0 %	3.0 %
80-90	8.2 %	3.5 %	7.4 %	3.2 %

CHICKPEA

TABLE III.11.2 Moisture (%) with Different Treatments in Chickpea Crop Area.

DATED; 5/5/1993

Depth (cm)	Cultivator	Mold Board Plough	Disc Plough	Chisel Plough
0-10	1.4 %	2.3 %	2.5 %	1.0 %
10-20	4.7 %	5.3 %	6.4 %	3.8 %
20-30	5.0 %	5.3 %	5.5 %	2.9 %
30-40	3.1 %	3.4 %	2.6 %	3.0 %
40-50	7.9 %	2.5 %	4.2 %	3.8 %
50-60	8.0 %	4.8 %	8.0 %	5.7 %
60-70	8.4 %	2.8 %	9.0 %	7.0 %
70-80	9.3 %	7.5 %	9.6 %	7.0 %
80-90	10.3 %	8.3 %	10.6 %	7.5 %