

**AGRICULTURAL DEVELOPMENT
IN THE
SRSC PROJECT AREAS**

Observations and Recommendations

Consultants' Reports to the SRSC

by

**Dr. Altaf Hussain
Dr. Sadaqat H. Hanjra
Dr. Mohammad Tufail
Mr. Mohammad Azeem**

Edited and Summarized

by

Dr. Takumi Izuno

July, 1992

SRSC

PARC • USAID • MART • WINROCK

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The MART (Management of Agricultural Research and Technology) Project is funded by the United States Agency for International Development (USAID). The MART Project's chief link to the Government of Pakistan is through the Pakistan Agricultural Research Council (PARC). A MART Project Coordination Committee composed of federal, provincial, and university representatives coordinates and guides project activities. Its purpose is to assist the Pakistani agricultural research system to strengthen its research management capabilities, and to improve communications, training, farming systems research, arid zone research, and research in the rural social sciences. Winrock International, through a contract with USAID, has responsibilities to assist with the first four of these tasks. Two international agricultural research centers, the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Agricultural Research in Dry Areas (ICARDA), are responsible for the other two tasks.

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EXECUTIVE SUMMARY

The team observed that with land resources available to the farmers extremely limited, the strategy for the future will have to be built around raising the productivity of existing land under cultivation rather than by expanding the cultivated area.

The most appropriate and successful way to raise productivity is through improvements in crop husbandry, better weed, insect and disease control, better plant configuration, use of better plant material, better soil fertility management, better timeliness of operations, rational crop selection and optimal use of available labor.

The same holds true for livestock enterprises with greater emphasis on productivity of existing numbers by improving nutrition and health as immediate goals with improving genetics as a long term goal to be initiated concurrently.

Specific practical recommendations were made during discussions and in writing to SRSC operational staff. These recommendations should be interpreted as suggestions for trial rather than guarantees for success. The process of adoption of these recommendations/suggestions involves the testing of these hypotheses, the interpretations of results, the training of the extension workers and farmer participation throughout in discussions and doing.

The team was highly impressed with the energy, attitude and dedication of the young SRSC staff and repeatedly remarked that it would be a pleasure to invite them for individualized short term visits. Promises were made to facilitate the acquisition of extension materials and seed and other planting materials by the SRSC.

The SRSC had already begun encouraging vegetable production and marketing. These activities should be further encouraged and the suggestion was made that by expanding the kitchen garden scheme designed to produce vegetables for home consumption, there will be an opportunity for evolution of market gardeners.

Similarly, particularly where moisture is adequate, producing pulses for home consumption may induce farmers to consider pulses as crops with commercial potential.

In the areas with limited moisture availability, pulses may have a distinct advantage over cereals.

Increased fodder production and adoption of preservation and enhancement measures are essential to improve livestock productivity. The high prices for milk provide sufficient incentive to increase supply.

The SRSC's 1991 Annual Review was found to be informative and comprehensive. A suggestion was made to use existing data to establish recommendation domains which will be useful for building confidence to support extension activities.

The team observed that SRSC staff members seem to have access to knowledge and material available from other institutions with which SRSC has established or is establishing links.

The team of consultants found this experience to be both enjoyable and rewarding. They also feel that they are in a good position to provide continuing assistance, which was the idea in selecting them in the first place.

Introduction:

The SRSC pursues a three stage strategy for rural development, i.e. formatory, consolidation and institutionalization. In villages where they have established a participatory organization base, SRSC is already in the consolidation stage wherein they endeavor to establish networking, linkages to development institutions, transfer of technology and surplus disposal and marketing networks etc.

SRSC has been "involved in a process of formal and informal participatory research". In-house expertise in the form of dedicated Program Agriculturist is available. His ability to work with farmers, village leaders, social organizers and educated, but less experienced SRSC agricultural and livestock specialists appears to be very good. Their progress to date is commendable.

The SRSC deemed it necessary, however, to engage a team of leading scientists representing several disciplines to study what has been done heretofore, to recommend what could be undertaken and to provide some support in testing the recommendations.

As originally envisaged, the team of consultants were to include a wheat breeder and a maize breeder from the CCRI Pirsabak, but when the time came to carry out the work, it was felt that six consultants plus SRSC staff plus the MART project research advisor would be too unwieldy a group. Consequently, the cereal breeders from Pirsabak will be requested to provide their expertise at another, appropriate time.

The consultancy team as recommended by the Winrock Provincial Research Operations and Support Advisor/COP and approved by SRSC consisted of:

1. Dr. Altaf Hussain, Director General (Retd.) Ayub Agricultural Research Institute and Director (Retd.) Vegetable Research Institute
2. Dr. Sadqat Hayat Hanjra, Chairman and Professor, Department of Livestock Management, University of Agriculture, Faisalabad
3. Dr. Mohammad Tufail, Director, Pulses Research Institute, AARI
4. Mr. Mohammad Azeem, Associate Coordinator (Social Sciences), Farming Systems Research Unit, National Agricultural Research Center

The procedure adopted by the SRSC was to have a social organizer and one or more agriculture and livestock specialists guide the consulting team to two or more villages per day to hold in depth discussion with representatives of the village organizations and to observe the fields and livestock.

For background information the consultants were provided with a freshly prepared copy of the 1991 SRSC Annual Review and a Program Report which was current as of June 1992.

The work was carried out during July 20-29, 1992. Time spent in the field was a period of four days in Charsadda and three days in Kohat with three days devoted to report writing and a debriefing session. The desired end product of this consultancy is not the report you have in your hands, but the linkages being established with other institutions to provide a continuing flow of information and germplasm in the field of agriculture.

**Consultancy Report for Improvement of Agriculture
with special emphasis on vegetable crops**

Dr. Altaf Hussain, Director General
Ayub Agricultural Research Institute (Retd.) and
Director Vegetable Crops (Retd.)

A. Charsadda Area

Pakistan is facing a serious problem of increasing population at the rate of 3% per annum; therefore, it is essential to increase the food production. As cultivated land resources are becoming limited, the strategy for the future will have to be built around raising the productivity of existing land rather than on expanding the cultivated area as has been done in past.

The most appropriate and successful ways to raise productivity is through improvements in crop husbandry, better weeding, better plant configuration, use of better planting material, better soil fertility management, better timing of operations, better land use management, rational crop selection and optimal use of available labour.

The SRSC project is spread over 4-5 distinct zones i.e.

- i) Tubewell irrigated area.
- ii) Canal irrigated area.
- iii) Salinity affected irrigated area.
- iv) Irrigated areas with high water table.
- v) Rainfed Areas.

Recommendations for improvement of agriculture in different situations are as under :-

1. Tubewell and Canal Irrigated Area:

Sugarcane:

Sugarcane is the major crop covering more than 80% of the cultivated area. About 50% of this area is under a freshly planted crop while 50% of this area is under a ratoon crop.

Sugarcane is generally planted as the intercrop in sugar beet, wheat or berseem during the months of February and March. It was generally observed by the growers that sugarcane does not give good growth, tillering and yield when planted as the intercrop with wheat and berseem as compared with the crop grown in a fallow field. However the sugarcane crop when grown as the intercrop in spring potato gave very good growth and tillering of sugarcane.

It was also observed that farmers are using a low seed rate of 40-50 mds per acre which results in low plant population and low yield.

In certain fields excessive weed population was observed. It was also noticed that fertilizer use is low and farmers are using mostly nitrogenous fertilizers.

The following recommendations are made for improvement of the sugarcane crop:

1. The soil should be prepared by using furrow turning plough for deep cultivation to develop deep root system.
2. Fertilizer application should be enhanced by using at least 150 kg N per hectare and 75 kg P₂O₅ per hectare. Fertilizer application should be completed by end of May.
3. Seed rate should be increased to 75-80 mds per acre to improve plant population.
4. Sugarcane should be planted as the intercrop in potato, garlic, onion and cabbage instead of in wheat and berseem.
5. Small farmers should be motivated to control weeds manually in time. However, big growers may apply chemical weed control.
6. When the plant crop is cut and the field is to be kept as a ratoon crop, the field should be ploughed and 15-20 kgs seeds of methra (fenugreek) should be broadcast in the field and irrigated. On germination this will suppress weeds and being a legume will fix nitrogen. When the methra crop is 50-60 cm tall it should be ploughed in the field and left as such. This will improve fertility of the field.

Wheat.

1. In addition to already grown wheat varieties like Pak-81 and Pirsabak 85, introduce two newly released varieties from Faisalabad i.e. Inguilab 91 and Pasban 91.
2. Excessive growth of weeds is a major problem. Small growers should control it manually while big growers may use suitable herbicides.
3. Balanced dose of fertilizer, nitrogen and phosphorus, should be applied in 1:1 ratio instead of nitrogen alone.

Maize.

Maize is generally sown by the broadcast method. Thinning is not done at an early stage, but when the crop is one meter high the plants are removed from thick areas for use as fodder.

1. Recommended synthetic variety Kissan should be planted and suitable arrangements for supply of its seed should be made.
2. Maize should be sown in lines 60-70 cm apart and sowing should be done with drill.

It will be desirable if small growers are motivated to plant maize by dibbler.

3. Thinning should be done within 15 days of germination keeping plant to plant distance of 15-20 cm.
4. Balanced dose of nitrogen and phosphorus should be applied using 3-4 bags per acre of nitrophos at sowing and 1 bag urea one month after sowing.

Sugarbeet.

1. Sowing should be done during October using imported seed.
2. Thinning should be done within one month of germination.
3. Removal of leaves for use as fodder 10-15 days before harvest is normal practice with some growers. This should be discouraged as it reduces yield and quality of crop.

Vegetables and Potato.

All growers of the project area should be encouraged to grow vegetables and potatoes over 1/2 to 1 kanal area for their family consumption. Vegetable and potato have the potential to produce much higher quantities of food within a short period. They are also cheap and are good sources of vitamins in the diet. Their increased consumption can decrease the consumption of cereals in which the province is deficient.

1. SRSC may obtain 200 vegetable seed kits from Faisalabad for next season.
2. After collecting demand for potato seed from growers, the seed of red skinned variety, Cardinal, may be obtained from Punjab Seed Corporation, Sahiwal.

Similarly for the spring season, potato seed may be procured from FAO Project, Gilgit or from M/S Jaffer Brothers.

Salinity affected areas.

SRSC is doing a good job in supplying gypsum for reclamation of salinity affected area. Sesbania (Dhainoha) is also grown as a reclamation crop.

As the area is reclaimed, the farmers should be encouraged to grow potato and vegetable crop besides the main crops of sugarcane, wheat and fodder.

Rainfed areas.

As rainfall is low during the summer season, wheat is sown during winter season through the broadcast method. Yields are very low.

The following steps are suggested for improvement of agriculture in this area.

- 1.. Soil should be ploughed deep with furrow turning plough to conserve more moisture.
2. Sowing should be done with drill.
3. Farmers should be encouraged to apply 2 bags of nitrophos fertilizer per acre for wheat crops.
4. Project may get seed of blight resistant varieties of gram for testing in this area.
5. Possibility of growing guar during summer season may be explored. If successful, it can help towards solving the fodder problem.
6. Improved varieties of sarsoon like 6007 and T14 may be obtained from Barani Agricultural Research Institute, Chakwal for testing in this area.
7. Farmers should be motivated to collect the surplus drainage water from their homes in pacca pits for applying to few plants of tomato, brinjal, sponge gourd and bottle gourd grown in their courtyard for family consumption.

B. Kohat Area

SRSC Project is spread over rainfed and irrigated areas. Recommendations for improvement of agriculture in different areas are as under :-

Rainfed area.

Villages Raise, Parshai and Keri Sheikhan were visited. We were very happy to learn that farmers in this area are using furrow turning plough for preparation of land. It helps in better conservation of moisture. The farmers are growing wheat, barley, gram, lentil, sarsoon and taramera during the winter season and sorghum, bajra, sesamum and groundnut during the summer season.

1. The Project should introduce seed of improved varieties of wheat like Rohtas, gram Paidar, lentil 85, sarsoon 6007, T14 and S9 and sesamum Til 90.
2. Similarly there is need to introduce improved groundnut varieties from Chakwal. Wheat, gram and lentil varieties are available from Faisalabad.
3. Farmers should plant vegetables like radish, turnips, coriander, spinach and peas during October. They can grow vegetables like Muskmelon, water melon and tinda gourd during spring season. Lady's finger and cowpeas can be planted during July after the first rainfall.

Irrigated areas.

Villages Manda Khel and Jowaro Gundai were visited in irrigated areas. The land of these villages is very fertile and farmers have started vegetable cultivation. Lady's finger is the major vegetable of the area and the standing lady's finger crop is in very good condition. Small areas are also planted under squash, bottle gourd, sponge gourd, radish, turnips, spinach etc. SRSC can help the growers through:

1. Introduction of radish variety, 40 days, for early planting during July-August.
2. Introduction of cauliflower variety, Sierra, and cabbage variety, Golden Acre.

3. Introduction of brinjal variety, Neeli.
4. All farmers of these villages should be motivated to grow vegetable over 1/2 kanal to 1 kanal area for family consumption. For this, the project should make suitable arrangements for supply of seed kits and seed potato.
5. Chillies crop is affected by collar rot disease. Farmers should be advised to treat their seed with suitable fungicides like Captan, Sandofan M, Ridomil at 2-3 grams per kg of seed. Seedlings should be dipped in 0.2% solution of Ridomil before transplanting. These should be transplanted on higher ridges.

Village Kana Cheena where only the local variety of rice is grown irrigated from natural spring water was visited. It was observed that plant population of rice is less. In the future it is suggested that rice may be transplanted at 20x20 cm to improve production.

Large weed population was observed in rice fields which may be removed manually. However during next year, the project can help the growers to get some suitable weedicide for control of weeds.

In village Mamoon Banda, Mr. Fazalur Rehman complained about low germination of maize seed of variety Kissan. The maize seed was broadcast. In the future it will be desirable if maize is sown in lines through drill or dibbler, keeping row to row distance of 60-70 cm and within row spacing of 15-20 cm.

Consultancy Report on Pulses

Dr. Mohammad Tufail, Director
Pulses Research Institute

Introduction:

Pulses are an important constituent of our cereal based diets. The per capita availability of pulses is low. To supplement the local supplies imports are made in varying quantities determined by the size of harvest of pulse crops. Since the population in the country is increasing at the annual rate of over three per cent therefore, similar increases in the production of pulses are needed to maintain the present level of availability.

The pulses are rich sources of protein, contain adequate quantities of minerals and are well supplied with lysine (an essential amino acid which is not synthesized) and tryptophane which are deficient in cereals. When pulses are taken in combination with cereals the value of the food is enhanced significantly over than that of either component alone. Therefore, considering their food value and importance in our diets, there is a need to increase the daily use of pulses.

Pulse crops have the ability to fix atmospheric nitrogen in symbiotic association with rhizobia and enrich the soil. Therefore, their inclusion in the cropping systems helps to increase the production of followers crops also. In general pulse crops are also more drought resistant than cereals and therefore, can be grown with greater success in the areas when rainfall is scanty and are characterized by moisture stress.

Recommendations:

Charsadda District:

In the irrigated area, where sugarcane is the predominant crop it is often planted in a standing crop of wheat or some other crop. The introduction of lentils on small plots for home consumption is recommended. The farmers will become familiar with the practices involved in growing lentils and will be able to assess the profitability of a commercial crop of lentils.

In other areas where soils are sandy/sandy loam with poor fertility and irrigation water is inadequate, practically all crops currently grown give low yields. Wheat grown in this area under barani conditions without fertilizer gives low yields. It is generally known that under such conditions, pulse crops give better yields of a more costly product. These may be tried alone or in combination with crops presently being grown in both irrigated and rainfed areas.

In rabi, lentil, gram and, hopefully, mattar, can make a better crop than wheat and may be tried along with wheat. Barley also withstands drought better and the feasibility of its substitution for wheat as a companion crop for pulses may be tried. Barley also tolerates saline conditions better than wheat and should be tried at places like Pakistan Kaley.

In summer, crops like mung and bajra can be tried individually and in combination. Moth and guar are also very hardy crops which can yield dividend in this area. A market channel will have to be developed.

In order to implement these few simple and practical suggestions, a seed supply will have to be identified. They can be obtained from the different Directors at the Ayub Agricultural Research Institute. Lentils, gram, mung and mash are available with Director Pulses. Barley is available with Director Wheat, Dr. Mohammad Hussain. Bajra is available with Director MMRI, Director ARI D.I. Khan, and possibly with Director BARI Chakwal.

Use of inoculum to increase nodulation in gram, lentils, mung and mash is also recommended. Director Pulses and AARI can supply.

Kohat District:

Arid Zone: In these areas farmers grow a number of crops like wheat, barley, gram, sarsoon, taramira, masoor, sugarcane, sesamum, bajra, mung, maize, moth and ground nut and know what to grow where. During the visit to the Kohat area, in one field with better fertility and moisture, plants of seven crops viz, bajra, moth, mung, sorghum, watermelon, muskmelon and guara were found.

Rainfall is low and soils are sandy loam with poor fertility. The farmers, in general, harvest very poor yields and at times when the rains are below normal, crops like maize even fail to produce any grain. It was encouraging to note that in some villages, farmers practice deep ploughing with furrow turning ploughs even by hiring it from another farmer. This helps in conservation of moisture in the soil and in raising a better crop. The practice of deep ploughing should be encouraged by facilitating the purchase and use of required implements to preserve the soil moisture for raising better crops. Fertilizer use is very low. Nitrogenous fertilizer only is used in very small quantities on patches of the wheat crop growing at places with better soil moisture. Since use of fertilizer is known to pay even under rain fed condition, the use of nitrogenous and phosphatic fertilizers should be promoted/facilitated. Consultation may be made with those

agencies/officials who can advise on the requirement and use of fertilizer in these areas and to start with validity of the recommendation should be tested on small plots to come up with the recommendation for different localities.

Farmer grow a number of crops both in Rabi and Kharif seasons. Whatever crop the farmers are growing, they should be facilitated to make a better crop.

The prevailing cropping system should be studied and farmer may be facilitated to increase the productivity of the individual crop. Good seed of a good variety is the basis of kind of yield we produce out of a crop. The farmers expressed their concern about the dwarf varieties of wheat with the remarks that these do not germinate when the soil moisture is low because of scant rains. Shorter coleoptile length may be a reason. Varieties recommended for rainfed areas across the Indus river in the Punjab should be tried. The seed can be arranged from the Director Barani Agricultural Research Institute at Chakwal. He can also be contacted for the seed of varieties of other crops recommended for rainfed areas. Research groups working on different crops at Tarnab, Pir Sabak, D.I. Khan in NWPF and at Ayub Agricultural Research Institute, Faisalabad in the Punjab province can also be contacted for arranging the seed of varieties of different crops grown in the these areas.

The gram crop faces the problem of blight disease. In the crop season when the weather conditions are favorable for the spread of the disease it totally devastates the gram crops. Blight resistant gram varieties recently released in the Punjab province, have also given good performance in the arid zone during the last year. These varieties should be tried at different places in the area to confirm the performance before promoting their introduction on large scale. The varieties are Paidar (86130), Pb91 (86039) and Noor 91-a variety of Kabuli gram.

Hangu: Mung is an important crop in parts of Hangu tahsil. The farmers complained that excessive growth is a problem. Weeds appear to be another big problem with this crop. Use of weedicides is an option which needs to be looked into carefully before any decision is taken to exercise it. A number of short statured, early maturing varieties of mung which take 70-75 days to mature are recommended for cultivation in the Punjab province. These varieties should be studied in verification/demonstration plots to validate the recommendations for large scale cultivation. The seed of these varieties will be available in small quantities with Ayub Agricultural Research Institute, Nuclear Institute for Agriculture and Biology and Coordinator Pulses, NARC. Larger quantities when required can be requested from the Punjab Seed

Corporation well in advance of the sowing time. Since mung is a highly self pollinated crop, its seed from the previous season's crop can also be used to plant the next crop. The adoption of short stature early maturing variety shall ensure better yields. Moreover the field will be vacated earlier than by the cultivars presently grown. This will enable the farmers to advance the planting of the following crops and thus the yields harvested will be improved.

SRSC has rightly visualized and recommended the increased use of leguminous crops in the cropping systems/rotation since it can help in getting better yields from the crops to follow, by improving soil fertility. We must demonstrate the profitability of growing leguminous crops to be able to promote their cultivation. Use of effective inoculum is very important and studies should be made to establish the need for it. Inoculum culture for different pulse crops can be arranged from Director Pulses, AARI, Faisalabad and the group working at NARC. Strains already present in the area should also be isolated and studied. For the use of effective strains on a larger scale, a pilot project for their multiplication should be established within the province in due course.

Consultancy Report on Livestock and Fodder

Dr. Sadaqat Hayat Hanjra
Chairman Dept. of Livestock Management
University of Agriculture, Faisalabad.

Observations and Recommendations for Charsadda District:

SRSC has an ambitious program. Unlike many other projects with a focus on rural development, SRSC has adopted a much more effective methodology. Their target group is subsistence farmers. These farmers have very marginal resources and often have a short term planning horizon and adopt risk aversion production strategies. The condition is further deteriorated by an alarming increase in the population of target groups.

The team is young and energetic, with lots of enthusiasm and abilities to absorb ideas and put them into practice. The multidisciplinary and farmers participatory approaches makes the program unique.

Perceptions of and Recommendations for Livestock and Fodder Production:

A. Feed resources:

In the irrigated areas covered under the project, fairly good amount of irrigation water encourages farmers to grow some fodder. Generally weeds and grass form bulk of feed. Wheat straw is added in varying amounts. In pockets where sheep and goats are raised, grazing and stall feeding are practiced. Concentrate feeding is quite low.

Recommendations for Irrigated Areas:

1. Introduce better quality fodders. Sadabahar, Mott and oats can fit in very nicely into the existing cropping system. Mott can alone revolutionize fodder production if planted in peripheral areas. It can be grown in hedgerows or as regular plantings.
2. Seed production at the farm level must be encouraged. Setting up a Mott nursery (also for bermudagrass, etc.) must be taken up immediately.
3. Seed procurement should be improved by:
 - a. Fodder Research Institute, Sargodha (request Director)

- b. NARC for oats and brassica for fodder (request Coordinator Fodder Crops)
 - c. Encouraging Pioneer, Cargill, ICI and Sandoz etc. to have agencies in appropriate locations, at least near the SRSC operational office in Charsadda.
4. Enrichment of crop residues and fodder preservation
- a. Urea treatment of wheat straw must be taken up especially where bulk is based on straw. UAF can provide fact sheets for circulation.
 - b. Silage making - presently, a fairly large quantity of sugarcane tops can be converted into silage for the scarcity period. UAF can train field staff and also provide fact sheets.

Recommendations for Rainfed Areas:

5. Improvement of grazing strips: At several sites grazing strips are available, but have very low carrying capacity, e.g. Buchey Kali. Recommended approach is to establish 3-4 enclosures protected with thorny bushes (and/or project can provide fencing) for 2 or 4 one acre strips at 3-4 sites. In this way the beneficial effects of this procedure of excluding the animals would be demonstrated.

Promising grass varieties will be provided by Drs. Izuno and Sadagat (Tifton 85 bermudagrass for better rainfall areas and buffelgrass and blue panic for comparatively dry areas).

6. Mineral feeding stimulates growth and milk production and accelerates sexual maturity.

B. Animal Health:

In most of the Charsadda project area, the animals were weak, emaciated and underfed. Deworming and vaccination is not practiced on a regular basis.

Recommendations:

- 1. Vaccinations must be carried out on all animals in the project villages by project staff or the departmental extension services.
- 2. Periodic deworming is necessary. The project should facilitate this by introducing low cost dewormers which may be done on a pilot scale.

3. The project staff must prepare a chart in the local language showing occurrence of ecto-and-endo-parasites. Also prepare fact sheets on the advantages of deworming. Involve Veterinary Research Institute, Peshawar.

C. Livestock Breeding Strategies:

The genetic potential of the livestock population in the Charsadda district appears to be extremely low. Most of the bovine and buffalo population is nondescript. Apparently, free matings occur with whatever bull is available in the area. Since the cattle population is more numerous, an improvement program for that species should be initiated immediately.

Recommendation:

There is no short term solution (except feeding and management) to improve production efficiency. Breeding and selection are long processes, but I think it is time to make a start. Let the next generation reap the benefits of our intervention. Introduce good Sahiwal bulls (source is LPRI Bahadurnagar) in 2 to 3 villages. If the fodder production improves over the years, the breeding strategies could be modified.

D. Training of Staff, Farmers and Middle Level Workers:

Several institutions can help in training project staff in production skills. The University of Agriculture Faisalabad and the Ayub Agricultural Research Institute can help in:

1. Training staff in fodder production and preservation
2. Conducting field days (2-3 days) for farmers' training right in the village
3. UAF Livestock Management Department can provide fact sheets on several aspects.
4. Audio-visuals on straw treatment and silage making can be made with nominal cost to the SRSC. Dr. Hanjra can be a resource person.

E. Developing Markets and Other Infrastructure Items

As the project moves with successful interventions, marketable surpluses will become available. Since the Village Organizations will be active in most of the project villages, it is recommended that:

1. Milk be taken in bulk to nearby cities/towns. Provide incentive to the farmers making deliveries (commission on a per litre basis). At several sites it is possible to adopt this approach. A person (farmer) who frequently visits the nearby town and is mobile (and willing to help others) may be entrusted with this task. On each litre carriage he gets token money as a bonus. This farmer must have a marketable milk surplus of his own to continue the work with interest. As the work expands (more milk to sell) other alternatives could be followed.
2. Avoid 2-3 commission agents on most of the product sale. This will create a condition where farmers will be in a better bargaining position.

The same strategy can be adopted for poultry.

F. Women's Activities:

The involvement of women in agricultural activities is comparatively low due to the prevailing social set up. However, they do help their male partners in activities like feeding and milking inside the house. The second major activity is poultry production.

Recommendations:

1. Rural poultry units should be strengthened by introducing better breeds (Fayoumi and Lyallpur Silver Black have merit).
2. The Lady Veterinary Officer should train women in basic skills of keeping birds healthy and profitable.
3. The project staff should initiate this program on poultry by vaccinating in 2-3 villages against Ranikhet (New castle disease).

Observation and Recommendation for Kohat SRSC Sites:

Rainfed areas (Rasee, Pershai etc.)

Fodder Production & Presentation:

Varieties of grasses which are drought resistant should be introduced. Enclosure measuring 4-6 acres may be established in these villages. Most suitable grass species would be Panicums and Cenchrus ciliaris. Bush type trees (could be used for browsing, lopping, fuel) have a merit. Local Acacia sp as well as imported Acacia sp (Acacia saligna, Acacia ampliceps) must be grown. Hanjra can provide seed for a

trial. Moth and guara must be encouraged. Fodder preservation and enrichment needs to be undertaken in these resource scarce villages.

Maize, sorghum and other stalks are available for feeding; hence, should be improved for feeding by urea treatment. Involve local range management experts (if possible) for range improvement activities.

Irrigated Areas:

Fodder production has great scope in most of the villages. The poor quality grasses on the bunds/water channels must be replaced by Mott hence forth. Increased fodder production will boost milk production and other production activities. For comparatively moist (marshy) areas, para grass is strongly recommended. Ipil ipil may be sown on marginal areas where other less useful trees/bushes are growing. Limpo grass should also be tried.

Fodder preservation (for shortage periods) may be introduced at a few sites. When Mott is grown on a large area, it could be converted into excellent silage.

Livestock Breeding Strategies:

Some excellent buffaloes and crossbred cows were seen in the irrigated areas around Hangu. Upon inquiry it was found that most of the crossbreeding occurred out of bulls owned by Afghan refugees. The SRSC should involve the Livestock and Dairy Development Department (Animal Husbandry Department) for working out a breeding strategy. This area offers tremendous scope for increasing livestock production. The climate is mild, good irrigation water is available and fodder production is possible. The products can be readily sold in the next door market. Present milk rates suggest increased activity would be profitable. The operation will be cost effective and sustainable.

Development Activities:

The SRSC staff should establish 2 plant nurseries preferably one each in Charsadda and Kohat. These two sites could be used for seed multiplication and storage of germplasm. Drs. Izuno and Hanjra will provide some fodder and grass species. SRSC staff can then multiply and distribute to the farmers. Tree nurseries should also be established at these two sites.

Consultancy Report
of
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A. SRSC CHARSAJDA PROJECT AREA REPORT

Recommendation Domains:

On the basis of socio-economic, biological and agro-climatic variables, the whole Charsadda district can be stratified into six different homogeneous recommendation domains, such as:

1. Sugarcane - wheat zone
2. Sugarcane - sugarbeet zone
3. Sugarcane - wheat/maize zone with salinity problem
4. Rained - cum - irrigated zone
5. Rained zone
6. Canal - cum - dug well irrigated area with mango orchards

The most important factors contributing to the delineation of the district into various domains are irrigation water availability, soil types and topography.

The emphasis on crop, livestock, orchards and timber tree plantation greatly varies under agro-climate circumstances. Although a few problems may have some general implications, these are mostly area specific; hence, they need special consideration according to each situation. The most common characteristics of the Charsadda district are as under:

Average size of holding is very small and ranges between 0.5 to 5 ha at all locations.

The major sources of irrigation are canal, supplemented by the private dug-well. In the southeastern part of Charsadda district, water is mainly managed through dug-well, hence its availability is scarce; whereas in the northwestern part of Charsadda district, water availability is in abundance and partly of free supply from the river. Towards the Malakand mountains, agriculture is mainly dependent upon rain water and partially irrigated by a limited supply of canal water (5-10% area).

The irrigated lands are generally fertile with clay loam texture. The barani lands are undulating with sandy loam texture and good drainage characteristics.

Owner operation along with tenancy is a common norm in the area. The share and lease are common forms of tenancy.

Hired labour is commonly used for the harvesting of wheat, sugarcane, and sugarbeet. The seasonal (winter) migratory population from the high mountains is commonly available for sugarcane harvesting and gur (raw sugar) making at cheap wage rates (Rs. 20/day). These labourers harvest and clean sugarcane for its tops to feed their livestock.

Sugarcane is the major crop of all the irrigated areas of Charsadda district. It is mainly intercropped in sugarbeet and wheat crops. One year ratooning is common and just after removing the sugarcane roots, wheat is planted. Almost 50% of the farm area allocated to fresh sugarcane in wheat and the remaining area, to the ratoon sugarcane crops.

The maize crop is planted in some pockets to get both grain as well as fodder for livestock. Barren stalks are pulled as green fodder and dry stalks used in the fodder scarcity period.

Berseem as rabi fodder is planted on a very small proportion of the area.

Livestock is an integral part of all the distinct farming systems of Charsadda district. The number and types of animals greatly vary on irrigated and rained ecologies. Both small and large ruminants are kept in greater numbers in rained areas. In irrigated areas farmers mainly keep 2 cows and 1-2 goats; Whereas, in rained areas on an average 5 cows, 12 sheep and 8 goats kept by each farm household. It clearly reflects that with marginal land resources the dependence of farmers on livestock is increased.

Wheat "bhusa" is the major source of animal fodder supplemented with seasonal fodder crops, wheat flour and weeds from sugarcane and wheat fields. Almost no farmers feed concentrates to livestock.

ISSUES IDENTIFICATION AND RECOMMENDATIONS:

In the light of the brief scenario of major farm activities in Charsadda district, the following priority problems were identified. Only those technology, training, research/extension options which may have practical relevance to the circumstances and are also available at certain research stations in Pakistan have been suggested.

Issue 1:

Nondescript local animal breeds with low production capacity.

Recommendations:

Through natural crossing and artificial insemination (AI) measures the production potential need to be enhanced.

Actions:

Dr. Sadaqat Hanjra can facilitate in the identification/purchase of suitable and quality bulls to SRSC staff.

Issue 2:

Animal health problem

Recommendation:

Appropriate doses along with curative measures

Action:

One SRSC livestock expert can visit Dr. Sadaqat's office for short term practical training.

Issue 3:

Low animal feeding due to:

- a. Fodder deficit/surplus periods
- b. No Kharif fodder cultivated on rainfed land
- c. Less productive, outmoded, old fodder cultivars (Berseem, sorghum)
- d. No separate area allocation to fodder crops due to small size of land holding.
- e. Cultivation of local mustard variety around wheat fields in rainfed area.

Recommendations:

1. Arrangement of seed of improved fodder varieties, (such as of oats and berseem). S.S. hybrid already introduced by SRSC.
2. Mott grass cultivation on the sides of sugarcane fields. It has a rapid adoption potential on sugarcane fields/sides in irrigated, semi-irrigated and saline areas. Its plantation under a crash program can facilitate the farmers in a big way to get sustainable fodder supplies, even in deficit periods. The tremendous potential for success and adoption exists in the semi-irrigated areas.

3. Urea treatment of wheat straw can increase the digestibility and crude protein availability. Hay/silage making of sugarcane tops and weeds from wheat and sugarcane is recommended.
4. Improved mustard variety (S-9 from NARC and others from BARI Chakwal) intercropping in wheat by bullock drawn "pora" will result in the enhancement of fodder supply in rabi season in rainfed areas.

Action:

SRSC staff keep continuous contact with Dr. Sadagat, Dr. Izuno, NARC Fodder Program and BARI Chakwal to implement the alternate, improved fodder and feed management practices.

Issue-4

More Kharif following due to low rains and poor moisture conservation practices on barani lands.

Recommendations:

1. Arrangement and provision of deep ploughing (Raja Hal) implements on rental basis to the farmers by SRSC staff. "Kamara" village of Fatehjang district could be a possible source of its purchase.
2. Regular FYM application is recommended to a part of barani land to ensure double cropping by increasing soil moisture retention capability. It is a common practice in barani Pothwar.
3. In rainfed villages on part of the lands, sesamum - wheat rotation is followed. Guar, mung, moth and arhar could be viable alternative crops for fulfilling fodder, pulses and fuel requirements in Kharif fodder scarcity period.

Actions:

1. Mr. Azeem can help the SRSC staff for the purchase of deep ploughing machinery and arranging a visit in barani Pothwar to observe and discuss practices with farmers.
2. Dr. Tufail can help in acquiring the proposed pulses and sesamum seed for SRSC.

Issue-5:

1. Low wheat and sugarcane productivity due to complex intercropping practices of sugarcane in sugarbeet and wheat crops. The small holdings, and multiple farm families mainly forced the farmers intercropping, mainly, to fulfill the food, grain, cash and fodder requirements.
2. Use of broadcast method for wheat cultivation in moisture deficient barani lands.
3. Low sugarcane seed rate (40-48 maunds/acre)

Recommendations:

1. Testing of alternate crops (such as potato, methra) along with other green manuring crops to break the old wheat sugarcane rotation is recommended for fertility restoration and profitability enhancement.
2. In depth monitoring of farmers intercropping practices is needed with respect to timeliness of fertilizer and intercropping practices. This information may facilitate in making the optimum recommendations for increasing system yields.
3. Introduction of "pora" wheat drill for wheat sowing to efficiently use the available moisture in rainfed lands.
4. Different seed rate along with alternate intercropping systems need further research/extension investigation with farmer participation.

Actions:

1. SRSC economist may be involved in data recording, planning and demonstration for above mentioned options.
2. A "Pora" can be purchased from a manufacturer in Fatehjang.

Issue-6:

Overgrazing of available waste lands in rainfed area.

Recommendation:

People participation in improved rainfed grasses species introduction and its controlled grazing with cheap fencing.

Actions:

SRSC staff can conduct exploratory survey of a specific village to understand farmer's interest, problems and cost effectiveness of fencing and grazing.

Issue-7

Little or no vegetable cultivation by farmers for home consumption and marketing.

Recommendation:

Provision of vegetable seed kits to growers, initially to fulfil the household requirements. It may eventually evolve into commercial cultivation.

Actions:

Dr. Altaf suggested to the SRSC staff for the acquisition of these kits from Vegetable Research Institute, AARI Faisalabad. This intervention is already in progress in the SRSC villages.

Issue-8:

Low quality inputs, low output prices and late payment of sale proceeds.

Recommendation:

The implementation of SRSC plan to incorporate input buying and output selling activities to fetch better prices and quality inputs with lower costs.

Issue-9:

Quality seed production for rainfed and other SRSC maize growing localities.

Recommendation:

The production of seed by declaring the whole village as seed multiplication village with no local maize variety to be planted for quality seed production. The natural barrier for improved seed contamination around rainfed villages support this recommendation.

Issue-10:

SRSC locations data consolidation.

Recommendations:

1. Good data comprising village population, literacy, employment, income, crops, livestock, credit etc. have already been collected by the SRSC staff from all target villages. Its tabulation and analysis work need further refinement for better illustrations of major homogeneous groups of farmers, even at each village level. This will help in suggesting more appropriate technological recommendations to distinct farm categories according to their needs and resources.
2. Diagrams need to be constructed to identify problems, their causes and facilitate problem prioritization to lead to a sequence of steps/recommendations to solve the problem.
3. Data on different cropping patterns practiced by the farmers need further consolidation to compare with new patterns demonstrated to enhance profitability.
4. The trained extension workers of SRSC farm communities keep records of the demonstration activities at the village level. More information on the cost of improved and conventional practices and the production differential can help in internal evaluation of performance of new recommendations and can also help in conveying the extension messages in more confident quantitative terms. The kinds of analysis include partial budget, individual enterprise budget and system profitability budgets.

Action:

Mr. Azeem can help the SRSC staff in providing technical guidance in appropriate data collection and computer analysis of previous as well as new proposed data sets.

B. SRSC KOHAT PROJECT AREA REPORT

The SRSC Kohat Project Area can be divided into two major domains of rainfed and irrigated ecologies. The rainfed areas can be further stratified into foothill/ steep lands, rainfed plains and rainfed with irrigated lands along rivers/streams. Further stratification of irrigated lands could be based on irrigated near town areas, irrigated vegetable mix areas and rice-wheat lands.

Characteristics of Rainfed Ecologies.

- In these zones rainfall is the major deciding factor behind the particular crop and livestock activities. The rainfed areas of Kohat receive very low rainfall and are frequently subjected to severe drought and semi drought conditions. The climatic variations did not allow the farmers to operate a persistent cropping system. According to the changes in frequency, volume and timing in rainfall, the types of crops and their cultivation time are adjusted accordingly.
- Wheat-fallow-wheat and fallow-sorghum-fallow are the most common rotations practiced in the area. The other crops adjusted in these rotations are til, taramera, gram, barley, mustard etc. Mostly the local old seed are used for all these crops. Although recently farmers have adopted newer wheat cultivars (i.e. Lyp-73, Pak-81 etc.), but C-591 the old desi variety is still planted on large area.
- Livestock production is a predominant activity. Both small and large ruminants are nondescript and of local origin. The common health problems of large ruminants are black water and foot and mouth diseases.
- In kharif season sorghum is the major fodder crop, fed as green fodder in summer and as dry stalk in winter season. In rabi season, mustard is mainly intercropped in wheat and pulled for animal fodder. Local seed is used for sorghum and mustard crops.
- The milk yields of the cow is very low (2-4 kg/day) mainly due to low potential local breeds and scanty fodder availability round the year.
- For moisture conservation and weed eradication, deep ploughing is performed just after the harvesting of wheat and before the commencement of monsoon rains.

- Due to steepness of soils, high earthen bunds are prepared around the fields to conserve soil moisture and soil erosion. On 10-20% of individual farm lands, water remain collected in the form of small ponds in the rainy season. At present these highly moist fields are only used to harvest better yields of wheat and to plant the maize crop. These small pieces of lands possess good potential for other alternative uses to increase fodder/vegetable/tree plantation.
- Zizyphus jujuba (Beri), Acacia nilotica (kikar) and Acacia modesta (phalli) mainly existed on waste lands and sides of the fields. The local "Beri" leaves are fed to small ruminants during the dormancy period of the winter season.
- Animal grazing throughout the year continue on fallow land and rangelands. The ranges are mainly filled with unpalatable grasses. Due to overgrazing, the regeneration capacity of these ranges is very low.
- "Pooli" is a very common weed present on fallow lands and have a great potential to be eradicated through community participation.

Recommendations:

- Improved seed acquisition, multiplication and dissemination may be the major short term activities in SRSC villages to enhance the per acre productivity of all major and minor crops. The seed resources were mentioned to SRSC staff during target villages visits.
- The recently released wheat varieties seed (i.e. Inqilab-91, Pasban-91, Rohtas-91) should be managed from AARI, Faisalabad. Dr. Altaf can help in the acquisition of seed from AARI.
- Construction of further mini-dams to ensure round the year water availability and fish farming option could bring a lot of prosperity to the farming community of SRSC village organizations.
- Construction of dug wells and introduction of high value crops like vegetables and fruits may provide some relief to the farming community from frequently prevailing drought conditions.
- Livestock breeding improvement programme, health care activities along with the enrichment of available fodder resources need further emphasis.

- In one village the SRSC staff succeeded in motivating the farming community to undertake the collective range development work by planting large number of multipurpose tree species. The motivation of school boys can further enhance tree plantation work if some appropriate training and incentive are provided to them.
- The Water Resource Management Department of NARC, Islamabad developed a rain water harvesting and tree plantation model on barani lands. It is recommended that SRSC management may send their representative to observe the adoptability of that model under their own conditions.
- The "Beri" nursery establishment and grafting with better quality species has a tremendous potential for increasing fruit quality and its green leaf availability for small ruminants in winter scarcity period.

The Irrigated Hangu Valley Characteristics.

- The "Hangu" valley irrigated lands are mainly present on the side of the water streams. Water from the main stream is diverted for irrigation purpose. Part of the valley is irrigated and is partly rainfed.
- Maize-wheat is a dominant rotation of the whole valley. The vegetable crops has potential near towns. Mung and rice are other crops planted on part of the lands. A very old local rice variety which has an established market and processing industry in the area is planted.
- Cow, buffaloes, sheep and goats are raised by all the farmers. Less productive and uneven fodder supplies round the year persist in the area.

Recommendations:

- Recommended technologies required to be introduced after a careful consideration of farmers practices or system implications. The poor germination of improved maize variety (Kisan) need to be investigated thoroughly and future planning should be based on farmers intentions to use more seed, sowing method and interculture practices.
- Mott grass is a potential fodder to be introduced to ensure regular and quality fodder supply.

- The testing of rice varieties like IRRI-9, IRRI-6, OP-45 etc. recommended to compare the yield, processing and consumer acceptance.
- The zero tillage wheat cultivation technology already tested in the rice-wheat zone of irrigated Punjab can also be considered by SRSC staff. Dr. Muneer Nayyer from AARI, Faisalabad may be consulted to understand the methodology and practicability of this technology.
- Similar to the community input purchase practices already carried out by SRSC staff, the scope for cooperative vegetable produce selling in local and long distance market for better prices needed to be explored.
- The quantification of different crops and crop-livestock systems is recommended to compare these with recommended systems. Appropriate data collection is a prerequisite of assessing the economic benefits realized by the farming community as a result of the adoption of technological interventions or system alternatives in the selected villages.

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