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STATUS OF MULTI-LOCATION TESTING AND PILOT PRODUCTION PROGRAMS IN NEPAL

by: K.D. Sayre, S.L. Shrestha, M.L. Malla, I.C. Bolo, David Lipinski, David Mergen and M.P. Rijal.

The Cropping Systems Program was initiated in Nepal in 1977. Six cropping systems research sites, four in the mid-hills, one in the inner terai and one in the terai, are currently operational. From the beginning, the Cropping Systems Program in Nepal has recognized that improved cropping pattern technologies developed at the research sites must be extended to farmers within the sites and to farmers in other similar areas. The successful extension of these technologies is, perhaps, the only valid measure of whether the cropping systems approach is a relevant one.

The Cropping Systems Program in Nepal began multi-location testing of site developed technologies and pilot production programs at or near the cropping systems sites over three years ago. This report will attempt to summarize the activities. It is divided into two parts; the first dealing with multi-location testing and the second with pilot production programs.

MULTI-LOCATION TESTING

Strategy of Implementation:

In Nepal we have used the term Pre-Production Verification Trials (PVT's) to refer to multi-location testing of technologies developed at the cropping systems sites in other similar locations. The selection of this name for the trials has tried to emphasize the concept that the purpose of the trials was not only to test or verify improved cropping pattern technologies in other locations but that the successful verification of

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these technologies should be the first step in their extension to other farmers in the area.

The first attempts in 1981, to utilize improved cropping pattern technologies outside the cropping systems research sites were conducted by Cropping Systems Program staff in areas relatively near to the cropping systems sites. This activity can be viewed as a learning experience but in most cases it was somewhat short-sighted because it was not closely integrated with the existing extension programs in the selected areas. It did help in clarifying the future role that the Cropping Systems Program could reasonably play in the extension of cropping systems technologies to other areas; that of training and backstopping other agencies as they, themselves, test the technologies in areas under their responsibility.

In 1982, the Cropping Systems Program published a document entitled "Guidelines for Pre-Production Verification Trials of Cropping Systems Recommendations". This document included a presentation of the strategy for multi-location testing of cropping pattern technologies developed in the research sites along with a clear description of the methodologies for selecting and describing areas to utilize PVTs and for conducting and evaluating the PVT's. It also included complete descriptions of the cropping pattern technologies developed in the sites and the corresponding agro-climatic and land-type categories where these technologies could be feasibly tested.

This document was widely circulated in Nepal with the idea of exposing individuals working in extension and adaptive research to the suggested approach. Follow up discussions were held with Regional Directors, District Agricultural Development Officers, and personnel involved with special, defined area agricultural development projects, irrigation projects and rural agricultural development projects. It was explained that the Cropping Systems Program would provide training and technical supervision for these agencies if they decided to use the PVT-approach as a part of their on-going adaptive research - extension activities. Several agencies from each category indicated their willingness to cooperate with the Cropping Systems Program and to use the PVT approach. Over the past three

years then, the emphasis by the Cropping Systems Program has been to assist these agencies through training and supervision visits so that their own local staff can effectively run the trials.

The methodologies that have been developed for implementing PVTs are as follows:

1. Site Selection

Emphasis is placed on selecting areas where there is potential for increased food production. Areas where there is already a high level of adoption of improved varieties, chemical fertilizer etc. are given a lower priority. There should be a commitment by the implementing agency to follow up the PVTs with resources to extend successfully verified technologies through planned Production Programs.

2. Site Descriptions

In most of the districts in Nepal, especially in the mid-hills, there is not adequate secondary information available to allow an immediate selection of the proper cropping pattern technologies to include in PVTs. Therefore, techniques for conducting rapid site descriptions of the proposed areas for conduct of PVT's has been developed as part of the overall methodology. The site description methodology relies on key - informant questionnaires directed at farmers in the proposed area as well as individuals working with supporting agencies in the area (extension agents, credit and input supply representatives). The time involved in conducting the description and writing up the report has been kept to a minimum and is well within the capabilities of local extension and adaptive - research staff after they receive training from Cropping Systems Program staff. The site description report focuses on a data summary sheet the presents the available climatic and soil characteristics of the area along with the predominant cropping patterns in the major land types, the major crops and varieties being grown and existing use levels of inputs. It also includes a recommendation for the improved cropping patterns to be tested in the PVTs in each predominant land type. Usually the initial improved cropping pattern technologies recommended for the PVTs involve

improved versions of the existing cropping patterns. However, in some situations new cropping patterns are recommended for testing if adequate information is available and qualified local staff are available.

3. Pre-Production Verification Trial (PVT) Design

The PVTs are cropping pattern trials utilizing the improved technologies (varieties, fertilizer rates, seed rates etc.) that were developed in the cropping systems sites. In an area chosen for PVT's, five farmers are selected for each cropping pattern in each land type. It is generally recommended that no more than four cropping patterns be selected in each area. This seems to be about the limit that can be managed since 20 farmers would be involved. It is recommended that the trials be concentrated within an area that can be readily supervised by the local staff. This usually encompasses one or two wards within a Panchayat in Nepal.

The farmers that are selected for the trials should be "average" in terms of land holding and current adoption of improved agricultural practices in the area. Each trial occupies approximately 1000 m^2 and the parcel that is selected should correspond to the appropriate land type as prescribed for the pattern. Each farmer agrees to grow the included crops in the pattern in the same parcel throughout the year. The farmer is provided the necessary inputs free of cost for each crop in the pattern, follows the recommendations under the supervision of the assigned staff and keeps the produce of the trials.

The local extension or researcher assigned to carry out the trials is responsible for collecting the required information from the trials. Data that is collected includes size of plot, amount of seed used, seeding and transplanting dates, spacing, kind, amount and timing of fertilizer application; amount of compost applied, irrigation, kind, amount and timing of pesticides used, harvesting date and the yield of a randomly selected 10-20 m^2 sample. In addition, a short interview is taken with the participant farmers to gain their reaction to the performance of the trials and to elucidate problems encountered.

Monitoring of the local farmer practices for the comparable cropping pattern is also included. Two methods are used. First, 10-20% of the area designated for the PVT can be devoted to the average farmer local practice for each crop in the pattern as determined by the site description. Second, fields of the same land type adjoining the PVT, where the local practices are being followed, can be monitored. In both cases, the same data is collected along with a yield sample as is used for the PVT. This allows useful comparisons to be made between the local practices and the improved technologies being tested. Each cooperator is requested to submit a copy of the data from each PVT and local practices to the Cropping Systems Program to allow continuous evaluation of the performance of the technology.

4. Extension Strategies of PVTs

The local extension or researchers responsible for the trials are instructed to conduct farmer field days at pertinent times to expose other farmers to the trials. Farmers from the surrounding areas are invited to view the plots. Participating farmers are encouraged to discuss the trials with their neighboring farmers and farmers passing through their villages to assure more exposure.

In many areas, lack of seed is a chronic problem. Therefore, the production from the PVT's is encouraged to be a source of seed for the next year. Farmers within the area are encouraged to go the farmers who are growing PVT's and purchase or barter for seed for their own use in the next year. This has proven to be very successful in some areas leading to a substantial increase in the area planted to a new variety introduced in the PVTs after only one or two year(s) of trials. However, the agency implementing the PVTs should be committed to assist in supplying needed inputs when it is decided that adequate information exists to merit launching a production program based on the PVT results.

Results of Multi-Location Testing in Nepal

Pre-Production Verification Trials have been conducted in Nepal for approximately three years.

According to a recent report summarizing the results of PVTs in Nepal, "the utility of PVTs in Nepal has been clearly demonstrated only in areas where there has been 1) a serious commitment to use PVTs as a targeted part of the adaptive research work, 2) the methodology as developed by the Cropping Systems Program has been followed in a stepwise manner, 3) permanent people have been assigned to follow through the trials and 4) a perspective that the PVTs are being used to develop suitable recommendations for a larger scale production program."*

Currently the Cropping Systems Program is cooperating with eleven agencies in twenty districts for the conduct of PVTs. These trials have included fourteen different cropping patterns. Space does not allow a presentation of the results of all of these trials. However, a pooled analysis of the results for 1982/1983 from the rice-wheat-fallow pattern from the various areas where the pattern was included in PVTs shows that the total average annual yield for the PVTs was 7.0 t/ha as opposed to 5.43 t/ha for the farmers' local practices. This indicates an average production increase of 29%. The average Marginal Benefit Cost Ratio (MBCR) for the PVT results compared to farmers local practices was 4.7. This example involving approximately 80 farmers illustrates the promising potential that PVT's have demonstrated.

In some areas, particularly the more remote areas in the mid-hills where little if any improved techniques have been introduced to the farmers in the past, there has been a spontaneous spread of some of the new varieties introduced in the PVTs by farmer to farmer exchange of seed after only one to two year(s) of the trials. Only in a few cases in such areas there has been a firm commitment to follow up the results of the PVT's with input supply to launch a production program capitalizing on the farmer interest. But in the few instances where this has occurred, modest production programs involving 5-50 ha are underway. Clear examples exist in the Rapti Integrated Development Project and the program being conducted by the Kaski District Agriculture Development Office.

*Lipinski, David and M.P. Rijal. Pre-Production Verification Trials in Nepal. Cropping Systems Program, Nepal, January, 1984.

In the terai areas, FVTs that were established in some of the irrigated areas have been useful in providing a basis for the large scale production program that will be described in the next section of this report.

Problems In Implementing Of Multi-Location Testing

As with any new program, there have been many problems associated with the conduct of the FVTs in Nepal. First and foremost has been the shortage of staff in the Cropping Systems Program to adequately train and supervise the local staff of cooperating agencies who have decided to use FVTs in their areas.

The fact that the FVT approach has not been adopted as a standard adaptive research - extension tool in Nepal has created problems. Essentially ad hoc relationships have evolved between the Cropping Systems Program and other agencies interested in using the FVT methodology.

The inclusion of a brief site description as a part of the FVT methodology with its corresponding socio-economic implications has been a consistent stumbling block. Field-based socio-economists are basically non-existent in Nepal. Local staff that are trained by the Cropping Systems Program easily grasp the straight forward training involving methods for establishing the field trials, collecting data etc. But, understanding why a site description is useful, participating in training to learn how to do it and finding time to carry out the description and summarize the results is sometimes difficult to achieve. In addition, the value of monitoring the local farmer practices to compare the improved technology in the FVTs is sometime difficult for local staff to understand.

Lack of site descriptions has led to several situations where FVTs were initiated with mediocre, even disastrous results. In some situations, however, the secondary data available and the knowledge of the local staff precluded the need of a site description and effective FVTs were established.

Another problem has been the temporary nature of the local staff involved in conducting FVTs. People who have received training in the methodologies are transferred to other jobs. In many cases, the replacements cannot be re-trained and trials are abandoned or are conducted incorrectly.

Finally, the lack of commitment to the approach of the FVTs is an occasional problem. Many times, local staff working in cooperating agencies view the trials as an "extra burden" to their normal work load. This has usually occurred when the trials were not a budgeted and targeted part of the normal work responsibilities with staff clearly identified to manage the trials. In addition, there can be a lack of commitment to view the trials as a first step in identifying useful, improved technologies for extension to the surrounding areas in a defined program to raise agricultural production. A recent survey to evaluate the impact of FVTs in several areas in Nepal provided an opportunity for farmers in these areas to comment on the trials. These comments were generally favorable. The farmers pointed out, however, that they would need more training on how to use the new technologies and a reliable supply of quality inputs on time to successfully adopt the technologies. Agencies who decide to use FVTs must be prepared to provide these services as a part of the overall program.

PILOT PRODUCTION PROGRAMS

Strategy for Implementation:

The Cropping Systems Program in Nepal has been involved in pilot production programs at or near the cropping systems research sites since 1980. The strategies that have characterized these programs have undergone continuous evolution as lessons have been learned and experiences gained. This report will summarize the current approaches that are being used in pilot production programs and will try to document how, in one situation, the pilot production programs initiated in two of the cropping systems sites have evolved into a large scale production program.

The current strategy of the pilot production programs has the following characteristics:

1. Cropping Systems Approach

The production technology recommended to the farmers is on a cropping pattern basis based on the results of the cropping systems research at the sites. The package of technology presented to the farmers covers a whole year's operation including varieties, timing of planting, fertilizer application, irrigation requirements etc. aimed at increasing the total production of the farm. In some cases, particularly in the mid-hills, the pattern technologies may include local varieties for some of the crops. This usually occurs with such crops as mustard, soybean or finger millet where no superior improved varieties have, as yet, been identified in research.

2. Production Team

A team, composed of a production officer (B. Sc. Ag.), a JT (Junior Technician) or JTA (Junior Technical Assistant) and agricultural assistants are organized to handle the informational and educational campaign. The team initially handles a block that may vary from 5 to 100 ha. In the mid-hills the area of responsibility may involve several small blocks because of the varying topography and land types present. In the Terai, where land is more uniform, the area usually involves a single block that is larger and better defined and has an immediate potential for expansion.

The production officer is the leader in organizing the informational and educational campaign in the target villages. He is directly involved in conducting farmers' meetings, field demonstrations, field visits and other extension activities. He also trains the JT/JTA and the agricultural assistants how to work with the farmers to convince them to adopt the recommended technology. The JT/JTA assists the production leader to make frequent visits throughout the production block.

The agricultural assistants are local farmers carefully selected and trained to motivate his co-villagers to join the production block and adopt the new technologies. Through the agricultural assistants, the team can identify receptive farmers and approach

local leaders. They serve as the "innovators" accepting and using the improved technologies on their farms. In some cases, the agricultural assistants have been provided inputs for about 1/3 ha as added incentive and to serve as demonstrators. The production from new varieties provided in this way has been a source of seed and the agricultural assistants have been encouraged to become local seed suppliers.

The agricultural assistants provide feed back to the team on the reaction of the villagers to the program, thereby guiding the team on how to conduct the program.

3. Block Approach

One important strategy of the program is the production block approach. The team, working with the local leaders and farmers, identifies a potential block of about 5-100 ha. in the village. Again, the size of the initial block or blocks is dependent on the area, being smaller, as a rule, in the mid-hills and larger in the Terai. The blocks are strategically located to allow wide expansion as the programs proceeds. The team concentrates their initial efforts to convince most of the farmers with land in the block to join the program. Every farmer in the block who participates in the program is assisted by the team to prepare a production plan advising them on what cropping pattern to grow, crop varieties to use, time of planting, kind, amount, timing and method of fertilizer application, insect control, water management etc. The team coordinates with the local Agricultural Cooperative, Agricultural Inputs Corporation and Agricultural Development Bank to try to insure that farmers receive production loans, if needed, and production inputs on time. The team concentrates their time and effort in a specified area with a specific group of farmers. It focuses the time and effort of the team and available resources in a manageable area to to insure the establishment of a successful and impressive demonstration. It gives the team the motivation and confidence to expand the program into near by areas. As the crop in the production block reaches maturity, farmers from adjoining areas are brought to observe the block.

In this way the ground work is prepared to expand the block to surrounding areas or to establish new blocks.

4. Training of the Production Team

Training of members of the production team is a continuing activity. The national level Cropping Systems Program staff provides training on a continuing basis. Before the start of each crop season and during the season, the members of the teams receive training to insure that they possess the necessary skills and knowledge needed to effectively transmit the new technology. The program is not static. Each production team is expected to expand the blocks during the following cropping season.

5. Effective Program Management, Monitoring and Evaluation

One very important component of the program has been effective program management and supervision. The production teams have not been left in isolation to carry on their programs. Supervisors make frequent visits to the production blocks and, together with the production officers in each block, bring problems to the concerned agency in the district. In most cases, these problems involve supply of credit, seed, fertilizer or release of irrigation water. When these problems cannot be solved at the district level, they are referred through the supervisors to the regional or national level concerned agencies. The production officers have been provided motorcycles to facilitate the follow up of identified problems and coverage of their blocks.

Socio-Economists have worked with the production teams, first by assisting in conducting initial rapid site surveys of the potential production block areas and by monitoring socio-economic aspects during each crop season to identify and rectify constraints.

At the end of each cropping season, socio-economist, again working with the production teams, evaluate the performance of the program in each block. Randomly-selected yield samples are taken from both participant and non-participant farmers' fields. Interviews are conducted with farmers to assess their reaction to the

program, verify if they in fact have understood and followed the technology recommendations and identify where improvements can be made. This monitoring and evaluation has allowed rapid identification of problems and constraints so that immediate modifications have provided solutions.

6. Seed Production and Exchange

Seed supply of new varieties for the production program, especially in the mid-hills but also in the Terai, is a chronic problem in Nepal. The program has attempted to identify farmers within the production blocks who could become local sources of good quality seeds. The agricultural assistants have fulfilled this role in some areas. The farmers are provided seed of the new varieties and are trained how to grow, process and store the seeds. Other farmers in the area are encouraged to purchase or barter seeds from these farmers.

Pilot Production Program Results

The results that have been obtained with pilot production programs in Nepal range from modest in areas associated with the mid-hill cropping systems sites to satisfactory in the rainfed area at Sukchaina in Parsa District in the Terai (although this rainfed technology has not expanded beyond the approximately 100 ha. of the village) to highly satisfactory for the programs associated with the irrigated areas near to the Terai cropping systems sites in Chitwan and Parsa Districts.

1. Mid-Hill Pilot Production Programs

The earliest pilot production program activities started in the mid-hill sites at Lele, Pusdi Bhumdi, Chauri Jahari and Khandbari in 1980 had disappointing results. This was attributed to several reasons:

a) Although the Regional Directors had agreed to consider the cropping systems sites as special pocket production programs, this information was not officially communicated to the Districts.

b) The recommended coordination and production committees were not formed or proved ineffective.

c) As a result of points a and b, problems of irrigation release in Chauri Jahari, credit availability in all sites and input supply in Chauri Jahari and Khandbari were experienced.

d) Attempts to organize farmer groups were not effective.

e) Information dissemination by the production teams was not effective.

It was recognized that the management component was insufficient. The production teams were not being systematically supported. The production teams also had difficulty to define where and how they could establish a base to concentrate their initial work. The initial approach was basically a blanket to cover an area broadly defined as "the area encompassed by the cropping systems site".

Beginning with the winter season 1981/1982, the approach to form defined production blocks was introduced along with addition management support for the production teams. Tables 1 through 4 present the results through several cropping seasons of the programs in the four sites. The tables indicate that it was possible to establish small blocks for several cropping patterns at each site. The technology generally performed well leading to marked yield increases as compared to local farmer practices which were economically feasible.

However, it can be readily seen in tables 1 to 4 that, except in the case of Lele, there was very little expansion in the area involved in the production programs from one season to the next. This is largely explained by the continuing, chronic problem of input supply and, to some extent, credit supply in the mid-hill areas. It has not been possible to attain a corresponding increase in the supply of these factors to sustain an expansion of the production programs. Many farmers, especially in Chauri Jahari, are firmly convinced of the benefits of the new technology but the inability to provide inputs (particularly fertilizer) and credit on time has drastically hampered the program.

The main benefit of the pilot production programs in the four mid-hill sites has been the spread of improved varieties into existing cropping patterns through farmer to farmer exchange of seed. In Chauri Jahari, over 80% of the 600 ha the cropping systems site is now planted to improved wheat varieties. Similarly, in Khandbari and Pumdi Bhumdi most farmers are planting improved maize varieties. The focus now of the program in the sites is to continue to facilitate this spread along with advising farmers on the effective use of the f rtilizer that does become available. Modifications are being made in the research strategies to realistically recognize that input supply to the mid-hills will likely continue to be a problem.

2. Terai Rainfed Area Pilot Production Program at Sukchaina

The adoption of improved technology at the Terai rainfed cropping systems site at Sukchaina in Parsa District has perhaps been one of the most striking successes in Nepal. Pilot Production Program activities were initiated during the winter season of 1980/81. Through hindsight it is possible to recognize that the initial strategy used at Sukchaina for the pilot production program encompassed most if not all the strategies now being used in general. A production team approach was followed; the team received good supervision; a local farmer leader was used to assist in the extension campaign in the village; arrangements were made to insure the supply of inputs on time; and credit was made available which, initially was needed by most farmers but after one or two crops, using the cropping systems technology, many farmers were able to purchase inputs on their own. Adequate rice seed was locally available because the initial seed stocks introduced in the research trials had rapidly spread to other farmers. The block production approach was not actually defined as a part of the initial strategy but in fact naturally occurred because of the compact area of the village and relatively uniform land type.

From the initial pilot production program activities started with wheat in the winter season of 1980/1981 which involved 47 farmers

covering 27 ha, almost 90% of the village area of approximately 100 ha is currently covered with improved rice varieties. The area devoted to wheat in winter in the rice-wheat pattern (approximately 50 ha) is fully covered by improved varieties. Considerable land that previously remained fallow in winter is now planted to wheat. Many farmers are closely following the fertilizer recommendations especially for wheat as well as the recommended management practices. Much of the remaining land in winter is devoted to crops such as lentil, mustard, chickpea and linseed usually mix-cropped. The yields of these crops have been indirectly increased because the use of early maturing rice varieties has lead to more optimum dates of planting for these crops.

During the winter season of 1983/84, a pilot production block was initiated involving approximately five hectares of chickpea and chickpea plus mustard. This program was launched to extend the technology identified in the site research which has indicated that the rice-chickpea pattern has produced the highest returns for the past three years of the patterns being tested. This program was successful and farmers indicate that up to 20 ha of chickpea or chickpea plus mustard will be planted in the coming winter season after rice.

An analysis of Sukchaina farmers who have participated in the pilot production program over the past four cropping seasons indicates there has been a 128% increase in their average yields as compared to farmers following local practices. The obvious goal is to extend this technology to other Terai rainfed areas in Nepal.

3. Terai Irrigated Area Pilot Production Programs

It is clear that many policy-makers in Nepal place highest priority on increasing production in the Terai irrigated areas where large capital investments have been made. The Cropping Systems Program recognized this urgency and concentrated resources to develop methodologies to extend the technologies developed in the Terai irrigated cropping systems sites.

The focus of the pilot production program that was initiated in the 1981/1982 winter season was clearly aimed at developing a credible example that could serve as a model for large scale production programs. It was further recognized that the Cropping Systems Program would need to achieve a level of success, initially relying on its own resources, to establish credibility for the developed strategies before a large scale commitment from the government could be expected. "Seeing is believing" was the motto of the program.

Table 5 traces the progressive growth of the program in Parsa District based on the rice-wheat pattern. From the very modest beginning in two small blocks in the 1981/82 winter season with wheat covering only 5 ha, the program has gradually expanded in each block and into new blocks. The strategies outlined earlier in this paper were fully utilized during the program. The first three cropping seasons of the program were largely implemented by the Cropping Systems Program staff. However, key people in the Department of Agriculture were fully supportive of the program and involved in the planning of strategies. Beginning in the fourth cropping season (summer rice, 1983) the Parsa District Agricultural Development Office became involved. Extension staff of the district office were directly involved in conducting the program in several of the new blocks started that season.

Table 6 presents the progressive growth of the program in Chitwan District. It was started in two blocks one year later than in Parsa but initially covered a larger area, reflecting the confidence that had been developed.

From the initial cropping season through the 1983 summer rice crop, socio-economic monitoring had indicated that farmers participating in the programs had obtained average yield increases from 20 to 60% as compared to non-participant farmers. Use of fertilizer by participating farmers showed an average increase of over 40% compared to non-participant farmers particularly for those who obtained credit. Surveys indicated that farmers generally perceived

a very positive impact of the program and that the production teams were effectively transmitting the technology and assisting them in procuring inputs and credit on time.

As a result of "Seeing is believing" the Ministry of Agriculture through the Department of Agriculture decided to initiate a 17,000 ha cropping systems based production program in irrigated areas in five Terai districts in the Central Development Region during the 1983/84 winter season. Tables 5 and 6 illustrate the increased areas in Parsa and Chitwan for this season. In addition to Parsa and Chitwan Districts, irrigated areas in Bara, Sarlahi and Rautahat Districts were included. A special budget allocated by HMG/Nepal and USAID was created. The budget was managed through the office of the Regional Director, Central Development Region and provided logistic support and manpower to implement the program in the five districts.

The program reflects a firm adoption of the strategies that had been demonstrated in the pilot programs.

1. The program is cropping pattern based involving primarily the rice-wheat-fallow pattern but small areas of rice-wheat, rice-maize-fallow, rice-wheat-dhaincha and rice-wheat-mungbean are also involved.

2. Production blocks of approximately 1000 ha each are the focal points of the program in each district.

3. Each production block has a production team composed of one production officer, two JT/JTA's responsible for about 500 ha each and ten agricultural assistants, one strategically located within each 100 ha of the block.

4. Management Committees at the national, regional and district levels involving extension, input, credit and cropping systems staff were formed to backstop the program.

5. The Cropping Systems Program is fully involved in assisting

the training and supervision of the program and in providing management guidance.

6. The socio-economic unit conducted rapid site description surveys of the areas proposed for expansion. Pre-production verification trials had previously been conducted in some of the areas indicating promising results for the technology.

The wheat and maize involved in the 1983/84 winter season, 17,000 ha production program have only recently been harvested. The socio-economic staff working with the production teams are currently surveying the results of the program. The following indicates the distribution of the targeted areas within the five districts involved and the achievement.

District	Targeted Area (ha)	Area Covered (ha)	% Covered
Parsa	8,000	5,41[illegible]	68
Chitwan	1,200	1,724	144
Bara	3,350	3,350	100
Sarlahi	2,450	2,465	101
Rautahat	2,000	1,700	85
Total :	17,000	14,650	86

A general shortage of fertilizer in the country caused by delayed arrival of imported stocks reduced the area covered, particularly in Parsa District. This, however, does not seriously detract from the overall impact of the program. The program has demonstrated the effectiveness of the strategies that have been developed at least in the Terai-irrigated areas where the service infrastructure is comparatively more established.

The emphasis now is to continue the momentum into the coming rice crop in the 17,000 ha area. Plans are being made to expand the program to 35,000 ha in 17 districts for the coming 1984/85 winter season. This will necessitate the development of a national structure to manage and implement the program.

Problems in Implementation of Pilot Production Programs

1. The principal problem has been the unreliability of input supply and efficient provision of credit. Provision of fertilizer and in some areas timely irrigation have been major constraints. Seed supply can be reduced as a constraint if the strategy for local production, storage and distribution is encouraged. Provision of inputs and credit in the mid-hills will probably be continuing problems in the immediate future.

2. Technology is available from cropping systems research to intensify production in irrigated areas by including spring crops before rice. Lack of reliable irrigation, particularly in the large irrigation schemes, has greatly inhibited the extension of these technologies. However, it is also recognized that labor and power constraints are also involved.

3. The problem of marketing in the Terai has become crucial. This years winter wheat crop was generally good in Nepal and farmers involved in the 17,000 ha program have encountered difficulties in marketing their surplus production. An effective marketing policy will be needed if continued expansion of the program is to be achieved.

4. From necessity, to start the program in the irrigated areas in the Terai and establish credibility, the existing extension system was initially by-passed to a large extent. As the program grew and demonstrated results, integration of the approach into the extension system has encountered some problems. This is particularly the case in some of the districts where the T and V extension systems is being followed. It appears that these difficulties can be overcome but the task would certainly have been easier if conditions would have allowed a closer coordination of the pilot production programs and the extension system earlier in the process.

5. The pressure to expand the program in the irrigated Terai area too rapidly is a potential problem. The proposed expansion into 35,000 ha in 17 districts across all five development regions is viewed by some as too much too soon. More time may be needed to consolidate the

program in the areas already included in the program and to upgrade management capabilities with training of new manpower to effectively increase the size of the program.

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Table 1: Results of Pilot Production Program, Lele

Pattern	Seasons and Crop				Ave. % Increase in Yield Over F.P.*
	Winter '81/82 Wheat	Spring 1982 Maize	Summer '82 Rice	Winter '82/83 Wheat	
Rice-Wheat					
Area (ha)	55	-	56	72	-
No. of Farmers	47	-	112	168	-
Yield (T/ha)	4.3	-	4.20	3.00**	36
Maize+Soybean-Mustard					
Area (ha)	-	4.5	-	-	-
No. of Farmers	-	N.***	-	-	-
Yield (T/ha)	-	6.25	-	-	N.***

* - F.P. Farmer's Practice

** - Wheat yields were reduced because many farmers could not obtain loans for seed and fertilizer. A markedly lower fertilizer rate was used as compared to the previous wheat crop.

*** - N. = Information not available.

Table 2: Results of Pilot Production Program Conducted at Pumdi Bhumdi

Pattern	Season and Crop				Ave. % Increase in Yield Over F.P.*
	Winter '81/82 Wheat	Spring '82 Maize	Summer '82 Maize	Summer 1982 Rice	
Rice-Wheat-Maize					
Area (ha)	6.0	12.6	-	8.9	-
No. of Farmers	18	57	-	4.0	-
Yield (T/ha)	1.10**	2.10	-	3.0	29
Rice-Fallow-Maize					
Area (ha)	-	2.4	-	2.2	-
No. of Farmers	-	13	-	7	-
Yield (T/ha)	-	0.90**	-	3.0	67
Rice-Fallow-Fallow					
Area (ha)	-	-	-	8	-
No. of Farmers	-	-	-	27	-
Yield (T/ha)	-	-	-	NA***	-
Maize/F.Millet-Wheat					
Area (ha)	-	-	NA***	-	-
No. of Farmers	-	-	62	-	-
Yield (T/ha)	-	-	6.05	-	142

* - F.P. = Farmer's Practice

** - Crop severely damaged by hail

*** - Data not available.

Table 3: Results of Pilot Production Program Conducted at Chauri Jahari

Pattern	Season and Crop			Ave. % Increase in Yield Over F.P.*
	Summer '82 Rice	Summer '82 Maize	Winter 1982/1983 Wheat	
Rice+Maize-Wheat+Mustard				
Area (ha)	8.0	8.0	30	-
No. of Farmers	17	17	NA**	-
Yield (T/ha)	2.00	1.90	3.10	42
Rice-Wheat+Mustard				
Area (ha)	14.5	-	30	-
No. of Farmers	35	-	NA	-
Yield (T/ha)	5.80	-	2.90	80

* - F.P. = Farmer's Practice

** - Date not available.

Table 4: Results of Pilot Production Program Conducted at Khandbari

Pattern	Season and Crop		Average % Increase in Yield Over Farmer Practice
	Spring 1982 Maize	Summer 1982 Maize	
Maize-Maize			
Area (ha)	29	7	-
No. of Farmers	45	56	-
Yield (T/ha)	3.2	2.7	44
Maize-F.Millet			
Area (ha)	30	-	-
No. of Farmers	110	-	-
Yield (T/ha)	4.3	-	95

Table 5: Progressive Growth of the Pilot Production Program in Irrigated Areas of Parsa of Parsa District For the Rice-Wheat Pattern

Block Location	Season and Crop				
	Winter 1981/82 Wheat	Summer 1982 Rice	Winter 1982/1983 Wheat	Summer 1983 Rice	Winter 1983/1984 Wheat
Mashihani					
Area (ha)	3	16	62	168	525
No. of Farmers	8	27	118	263	853
Mahuwan (Parsauni)					
Area (ha)	2	11	54	75	398
No. of Farmers	7	25	103	117	887
Jagarnathpur					
Area (ha)	-	-	50	120	662
No. of Farmers	-	-	70	168	955
Bhaurator					
Area (ha)	-	-	-	50	966
No. of Farmers	-	-	-	70	1192
Pakhariya					
Area (ha)	-	-	-	50	734
No. of Farmers	-	-	-	71	910
Lanwadi (Hariharpur)					
Area (ha)	-	-	-	50	632
No. of Farmers	-	-	-	73	967
Sugauli					
Area (ha)	-	-	-	-	888
No. of Farmers	-	-	-	-	1342
Bhikhampur					
Area (ha)	-	-	-	-	606
No. of Farmers	-	-	-	-	1099
Total					
Area (ha)	5	27	166	513	5411
No. of Farmers	15	52	291	762	8025

Table 6: Progressive Growth of the Pilot Production Program in Irrigated Areas of Chitwan District for the Rice - Wheat Pattern*

Block	Season and Crop		
	Winter 1982/1983 Wheat	Summer 1983 Rice	Winter 1983/1984 Wheat
BLOCK 'A'			
Area (ha)	133	244	927
No. of Farmers	70	104	545
BLOCK 'B'			
Area (ha)	79	190	797
No. of Farmers	74	167	627
Total			
Area (ha)	212	434	1724
No. of Farmers	144	271	1172

* - A modest area was devoted to the pattern rice-rice-wheat. In addition, small areas were planted to rice-wheat-dhaincha (12 ha. with 19 farmers) and rice-wheat-mungbean (1-2 kg were distributed to 19 farmers).
The dhaincha was plowed down for green manure and mungbean was harvested for grain. Seed for both was supplied through the Cropping Systems Program for demonstration purposes.

IAS/KDS: ds
May 28, 1984