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His Majesty's Government of Nepal

Ministry of Agriculture

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INTEGRATED CEREALS PROJECT

SEMI-ANNUAL REPORT

OCTOBER 1981 TO MARCH 1982

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I. SUMMARY

1 - This period covers the beginning of a three-year extension of the Integrated Cereals Project after the completion of an initial five-year period. Emphasis during Phase II is to stress production programs; dissemination of information concerning technology and methodologies; additional nonacademic training; additional commodity support; and a continuation of resident-specialist support to cropping systems research and production; and consultancies for general support.

2 - Staffing of resident specialists was reconstituted. I.C. Bolo joined the staff in November as production specialist and .D. Sayre joined the Cropping Systems staff as agronomist in October on transfer from the maize program. M.G. Van Der Veen continues as agricultural economist and W. H. Freeman as Project supervisor.

3 - Production plans were developed for the wheat crop portion of patterns in Parsa district, Lele in Lalitpur district, and Pumdi Bhumdi in Kaski district. Strategies for the program, based on the block concept, were to more easily demonstrate impact to farmers and officials, use these blocks as a training base, and develop plans for larger scale production programs based on experiences in pilot production.

4 - Survey and preproduction verification as basic steps to production programs were initiated in special defined-area projects, primarily the Rural Area Development Project of USAID, the Hill Food Production Project, and the Narayani Zone Irrigation

Project and plans formulated to implement programs in other project areas in 1982-83.

5 - The Summer Crops workshop was held in January and attended by over 100 research and extension officers of the Department of Agriculture, and Dr. M.M. Sainju, Honorable Member of the Planning Commission. Research and production reports were received on all summer crops and plans discussed for seed multiplication, production, research and outreach of the research stations.

6 - With the departure of three students to UPLB in October, all the academic trainees selected and funded under the ICP have inaugurated their academic programs. During the same period three trainees returned to Nepal, leaving 22 still to complete their programs.

7 - Doug Neeley served as consultant in statistics and made special studies of experimental field plot designs for trials in the Hills, conducted training for rice scientists at Parwanipur, and advised on the layout of trials for multilocation tests in farmers' fields.

8 - Rice harvest at the beginning of this period was the best in the nation's history but still might not be a take-off point of sustained expanded production increases that are needed to sustain Nepal's growing population and provide sizable exports as a source of badly needed foreign exchange.

9 - The wheat crop area was somewhat reduced in the eastern region but crop prospects at the end of this period appeared promising. Leaf rust did less damage this year but continues a threat to farmers so long as RR 21 is so extensively grown. Fortunately farmers recognize the problem and are shifting to other varieties, mainly UP 262, as seed becomes available.

II. PRODUCTION PLANS

Soon after his arrival of Mr. Bolo traveled extensively with Mr. M.L. Malla, Agronomist, Agronomy Division, to the cropping systems sites to make plans for production campaigns. His observations were "The present level of adoption of the cropping systems technologies at the different sites is, in general, low. The delivery systems of the program have been very weak especially on credit and supply of inputs. Loans for seeds and fertilizers were not released on time. The supply of seeds of maize and wheat are inadequate and of poor quality. There was acute shortage of fertilizer in all the sites. These factors denied the program the chance to demonstrate to the farmers the impact of the technology."

They also visited some of the districts where multilocation testing was to be done. These were Sarlahi, Bara, Rupendehi, and Kaski.

Pilot projection programs were established in Lele, Pumdi Bhumdi, and in Parsa District, Masiyani and Parsauni. These locations involved 80 farmers and 16.2 ha. and are presented in more detail in Table 1.

The multilocation (preproduction verification) testing was reviewed with research and extension staffs and project area representatives. These trials were assigned to personnel of research stations as part of their research outreach activities or to the staff of special projects such as the Rapti Zone or Hill Food Production Project of four districts in Gandaki Zone. Distribution of preproduction trials are presented in Table 2 along with areas of production targeted for future years.

A report was prepared on pilot production plans entitled "Plan for Implementing Cropping Systems Pilot Production Programs, 1982-83". This was prepared to enable plans to be developed in the respective projects for implementing production programs.

Important features of the pilot production programs included the concept of production "blocks" of 3-10 ha. to enhance demonstration effect; to more easily supervise the area; to more effectively transmit the technology to farmers; to enable servicing of farmers for input and credit needs; and from these experiences to enable strategies to be developed to involve larger areas so that more farmers and national production would be benefitted.

Implementation of these plans has included close collaboration with the ADBN to develop credit procurement systems that will provide credit on a more simplified and on-the-spot basis. In other words, credit and other inputs are to be provided to help farmers increase production rather than to impede and hinder farmers from achieving increases by actions which make credit difficult to obtain or have inputs arrive too late to be effective in the farmers' crops.

A seed multiplication and seed exchange program to enable seed to be available locally as a product of the farmer-to-farmer seed system should enable increased seed supplies to be available locally upon which production programs can be based.

Three-day training programs were held in March to more quickly acquaint other persons with methodologies of surveys and preproduction verification trials as well as the technologies to be utilized in different areas and projects. Assistant Agronomists, JT's and JTAs were involved. Thirty eight

participants attended the program in Parwanipur and Parsa dnd 29 attended in Pokhara, Khairenitar and Pumdi Bhumdi.

The training sessions and the attempts to utilize the methodologies and technologies have been well received. It is one of the first attempts made to provide extension personnel with a rational systematic approach to serving farmers based on farmer needs and by developing information in their fields which can be a basis for production programs in the same area. It also provides a means of contacting farmers to learn their situation and get reactions to the technologies being tried in their fields.

In the previous year, 1981, preproduction verification testing in the Rapti Zone was initiated very systematically by reviewing with ADOs and other officers the objectives of the program and then carrying out training of these officers for conducting the surveys. These two aspects were completed in March and April 1981 after which they returned to their respective districts and carried out the surveys. Results were summarized and presented to the cropping systems staff. Some of these surveys were very well conducted and summarized.

These surveys were reviewed and plans made to implement preproduction verification trials in all the districts of Rapti Zone in the wheat season, 1981-82. The support this effort Sandy and Patty Smith, PCV's working with the Cropping Systems Program, were transferred from Lele to Tulsipur. This occurred in time for the review of the survey information and selection of patterns to use along with the technologies so that plans could be made for seed and fertilizer for the preproduction verification trials. Five farmers in an area were selected to grow a pattern, making a total of 25 farmers in the five districts. Additional patterns increased these numbers in some districts.

Sandy Smith was to monitor the agronomic aspects of the trials and Patty the socio-economic aspects. By the end of this reporting period the officers of the region were pleased with the trials and wanted to expand the program to include other panchayats and maize-based (upland) patterns.

For production programs in the cropping systems sites, information materials to convey technology in farmer terms were under preparation for the following patterns:

Wall posters

Khandbari - Maize - Maize
Lele - Rice - Wheat
Pumdi Bhumdi - Rice-Wheat-Fallow
Chauri Jahari - Rice-Wheat-Fallow
Chauri Jahari - Rice + Maize - Wheat
Parsa - Rice-Wheat-Mung

Flip charts for the same patterns will be produced in smaller numbers, while leaflets covering patterns for Lele, Parsa, and Chauri Jahari will total 3500.

In order to more effectively supervise the programs a Management Information System report has been prepared which is submitted by site coordinators every two weeks. It is hoped that this will help eliminate bottlenecks that develop in implementing production programs.

III. CROPPING SYSTEMS

Special efforts were exerted at this time to complete "Guidelines for Pre-Production Verification Trials of Cropping Systems Recommendations".

This report sets forth the background of the cropping systems approach to implementing production programs through a series of logical steps as an approach to understanding the farmer, what he is doing and what technologies might be available to help him increase his production. These methodologies include a survey of an area such as a panchayat, which has been identified by reconnaissance, to get a background of what cropping patterns farmers are using and which ones are predominant. This information is then reviewed with the Cropping Systems staff and concerned extension staff to determine what technologies would fit and then the establishment of trials and collection of necessary data, agronomic and sociologic, upon which decisions could be based regarding production programs and strategies. Detailed instructions and "instruments" are provided to enable surveys to be conducted upon which decisions can be based. Instructions are presented on over 30 different patterns which could be selected for trial depending upon the land and water conditions and patterns which farmers were already using. These patterns were classified into 8 broad land and water regimes to assist extension people to determine which would be the most likely patterns to try in preproduction verification.

Agronomic data from cropping systems trials were summarized for presentation at the cropping systems working group meeting in December in Burma and at the Summer Crops Workshop Meeting in late January 1982.

Some significant portions of these summaries are presented below.

"The results of some of the cropping patterns tested during the cropping season which began in winter 1980 and ended with the harvest of summer crops in 1981 are presented in Table 3. In many of the promising patterns being tested, there is an intensification of land use as compared to the traditional patterns through inclusion of another crop(s) where land was previously fallowed. Essentially all of the promising patterns involve the replacement of local varieties with improved ones coupled with the use of modest levels of applied fertilizers.

In all of the sites, the improved rice varieties being used in the promising patterns are markedly better yielding than the locals used in the traditional patterns with the exception of the improved rice variety (Bindeswari) being used in the rice+maize-wheat pattern in Chauri Jahari. There is some farmer resistance to the improved rice varieties at some sites in the mid-hills (especially in Khandbari) because of short straw and difficulty in threshing as compared to the locals. This is somewhat surprising when the apparent markedly higher yields of these improved varieties are considered.

Component technology studies this past year centered around three main areas. These are: 1) variety testing, 2) comparisons of new planting methods in maize and wheat with the traditional methods, and 3) further refinement of fertilizer recommendations with particular emphasis on determining if responses to P and K occur when applied at (with) the recommended levels of N.

Maize variety testing has indicated the potential usefulness of the newly released, early-maturing Arun variety. Arun appears to perform well in the rice-wheat-maize pattern in Pumdi Bhumdi, Parsa and Ratna Nagar where its earliness and good yielding ability are noteworthy. Also it appears to be a highly appropriate variety for use in the second maize crop in the new maize-maize pattern being tested in Khandbari. In Chauri Jahari, Arun is proving to be the first improved variety that farmers are enthusiastic about for use in the rice+maize patterns.

The variety testing program in rice has also identified three new high yielding varieties for use in the mid-hills

to replace the Taiwanese varieties (Taichung 176 and Chainung 242 which have met some farmer resistance in some sites). These new varieties are K-39, IR 2298 and IR 3941 and will be widely tested in pattern trials next year.

The wheat planting method studies comparing line-sowing behind the plow versus the farmer's method of broadcasting the seed and then plowing showed only minor yield differences in most sites. It was apparent, however, that seed rates could be reduced and yields maintained by the line-sowing method.

The fertilizer trials were largely inconclusive in pinpointing responses to P and K. Further work is needed. Some design changes will need to be made. The current N recommendations are probably realistic and will continue to be so given the fertilizer supply constraints in Nepal in general and in the remote areas in particular."

Problems related to improving cropping patterns and production, and expansion into production campaigns include:

"It is clear that more attention needs to be given to the compost/farm yard manure use especially in the mid-hills in terms of how its use interacts with the chemical fertilizer recommendations.

There are some situations in most of the sites where further work with green manure crops to improve soil characteristics needs to be carried out.

Better varieties of the minor crops (especially grain legumes like soybean, mungbean etc.) need to be identified.

More emphasis needs to be given to identifying fodder/forage species to produce more animal feed for use in feed shortage periods. Both forage crops to include in the patterns and fodder trees, for example, to plant within the farmstead need to be investigated.

Concentrated efforts must be directed at developing better rice varieties for high production potential areas in the higher elevations of the mid-hills.

Some effort needs to be directed towards developing better farmer-level seed storage systems to help farmers

maintain their own seed stocks of sound quality. This need is especially felt for storage of maize and wheat seed."

The socio-economic team processed data on surveys conducted on the 1980-81 wheat production demonstrations at the cropping system sites. Results would indicate that efforts toward production campaigns have had little direct impact. There are several reasons for this, one being that there hasn't been real effort to place production on a campaign footing with serious dedication and commitment from various levels of administration and implementation. Production programs based on cropping patterns have been "experimental" and have not been accepted or funded by extension. The other is that lacking this incorporation into extension planning it was not possible to create effective linkages with agencies concerned with inputs, credit, and irrigation.

A second feature of the program that has led to lack of significant impact is that at Lele level of varietal adoption has been high and also level of input use is high so that the differences between users and non-users of cropping systems technology were often not readily evident.

In Pumdi Bhumdi users of the variety RR 21 were generally adopters of this variety prior to a production program. These farmers had benefitted by exposure to the technology and were early adopters of the variety. This was perhaps even more true at Chauri Jahari where the new varieties had been introduced perhaps one year ahead of the cropping systems research program. With the research phase the varieties were given more systematic exposure so that adoption took place <u>before</u> a campaign could be organized or had a CS basis for being organized.

It was found that changes of varieties or fertilizer inputs alone had little immediate effect on production. It was only when these two technologies were in combination that farmers were obtaining significantly better yields. The potential for benefit was certainly greater among farmers growing improved varieties but they could not capitalize on this potential since other components of the technology were lacking.

Surveys of maize production were made at Tumlingtar where there is some evidence that the maize-maize double crop pattern may be spreading among farmers. Replacing the first-crop local variety by Khumal yellow gave an increased yield of 27% and replacing the second crop local variety with Arun, an early variety, the yield increased 73% (35% in crop cuttings). Combining Khumal yellow and Arun provided an overall increase in yield of 46%. Replacing Khumal Yellow with Arun in the second crop gave slightly better total yields. Even though Arun appeared to yield somewhat less than Khumal Yellow in the second planting, the earlier maturity puts its production ahead of Khumal Yellow on a per day basis by about 10%.

This is only one year's data but might be expected to be sustained in view of the earlier maturity of Arun which would make less demand on available soil moisture. Farmers found Arun as early as their local which enabled an earlier harvest thus reducing damage by monkeys and other hazards.

Methodologies for monitoring and evaluating pilot production programs were developed in collaboration with the production agronomist.

Objectives of monitoring and evaluation of pilot production programs include:

1 - Provide rapid feed back to the management committee concerning problems.

2 - Document the superiority of the recommended technology when used on more than just an experimental scale.

3 - Document the performance of support institutions and agencies concerned with production.

4 - Identify the main reasons for non-adoption or only partial adoption.

This information is vital to being able to evaluate the technology and to be able to plan programs for wider scale production campaigns which must ultimately reach thousands of hectares and tens of thousands of farmers.

IV. COMMODITY PROGRAMS

With the completion of the calendar year 1981 Dr. Samoto finished his assignment with the National Rice Improvement Program and returned to Japan. During his assignment he was able to bring stronger focus on rainfed rices for the Terai and to emphasize the use of locally adapted varieties in breeding programs to develop rice varieties for these conditions. Since over 80% of the rice crop is grown under rainfed lowland conditions, his focus on this problem provided a good base from which varieties can be expected to be produced which will be suitable for these conditions. Masuli (Mahsuri), a variety developed by Dr. Samoto in Malaysia, is one such variety which has received widespread acceptance under these conditions. However, Masuli has a number of weaknesses such as blast and lodging susceptibility which introduces some risks and the longer duration of Masuli interferes with timely sowing of the succeeding wheat crop in many Terai farms.

The Summer Crops Workshop held in January 1982 provided opportunity for presentation of research results on rice, maize and other summer crops. The importance of these workshops was stressed by the presence of Dr. M.M. Sainju,Honorable Member, Planning Commission and the comments which he made to the gathering of research and extension workers.

Some of the important aspects of the workshop reports were summarized by Dr. B.B. Shahi, Coordinator for rice and Mr. Gopal R. Rajbhandary, Coordinator for maize.

Dr. B.B. Shahi, reported that the rice commodity program was much more active in monitoring and organizing production. Twenty one districts were visited by teams from the rice program where they observed minikits, FFTs, and spread of improved varieties in

farmers' fields and crop production in general. Crop production was reported as generally good. Crop cuttings were reported from 24 districts for over 300 irrigated farms and over 100 rainfed farms. Yields ranged from 1.5 T/ha at Bhojpur to 4.7 T/ha for Kathmandu. Yields of rainfed rice varied much more and approached the yield of the irrigated cuttings in districts where rainfall was good.

Three new varieties were to be recommended to the variety release committee. These included IR 2298 to be named (Himali), IR 3941 (Kanchen) and Mala/J 15 (Malika). The first two are varieties for the mid-Hills. Himali is distinctive in that it has good aroma and slender grain. Kanchen is slightly earlier and has good eating quality soon after harvest. Malika is a Terai variety which may be a good substitute for Ch 45. In the Hills, Ch 45 is being replaced by K 39 (Ch 1039 X IR 580) in the Trisuli area.

Some very interesting new varieties (BG 400-1 from Sri Lanka) offer promise for gall midge resistance and disease resistance. A dates-of-seeding trial showed the merit of Laxmi, Durga, and Janaki for early sowing. Chandina and Bindeswari sustained good yields when sown in mid-to late June. Chandina was least affected by delayed sowings and produced almost 3.5 T/ha when sown on 31 July. For rice-rice-wheat patterns combinations of Laxmi and Bindeswari and Laxmi and Chandina gave two-crop yields of between 9-10 T/ha. Sabitri and Masuli continue to perform well as full season varieties but offer limited scope to be included in rice-rice-wheat patterns. If first crop rice can be harvested by mid June these varieties would appear to offer promise and such a pattern is developing in the Trisuli area (Nuwakot district), where the first crop is K 39 followed by Masuli. Maturity and

yield records from this trial would indicate Sabitri would produce higher yields and could be harvested as much as a week earlier than Masuli.

A nitrogen level x spacing trial with Masuli and Sabitri produced data substantiating results from trials in other countries. With lower levels of fertility (0N or 40N) yields can be increased by increasing plant population, in this case from 25 to 50 hills per square meter. The standard spacing (20 X 20 cm) produced about 20% less than the closer spacing (20 X 10 cm) in Masuli while the reduction was only about 10% in Sabitri. At the 40N and 80N Kg/ha. rates the differences were less but the standard spacings were consistantly producing 10 percent less than the close spacing while the 20 X 30 cm spacings were about 15 percent less in each variety. Farmers can substitute a low cost technology, seedlings, for a higher cost technology, nitrogen, by increasing plant populations to compensate for the lower tillering of the lower fertility available in many production situations. In the case of Masuli, the extra plant population was equal to 40 Kg N/ha. i.e., the 0N, close spacing was equal in yield to the standard spacing at 40 Kg N/ha and the yield of the 40N level at close spacing was equal to the 80N level at the standard spacing. With the more fertilizer responsive Sabitri the trend was similar, especially at the 40N level and close spacing compared to the 80N level, standard spacing.

A water management experiment, again comparing Masuli and Sabitri at four levels - continuous submergence (3-5 cm) continuous saturation, rainfed bunded, and rainfed unbunded produced data indicating the benefits of proper water management. The continuous submergence treatments taken as 100% were compared with the other treatments. Losses were about 20% when the soil was saturated,

approximately 25% when the crop was rainfed and bunded, and almost 35% when the plots were rainfed and unbunded. Interestingly Sabitri out-yielded Masuli in all water treatments with an average increase of 12.7% for all treatments, with the greatest difference, 19.6% occurring at the saturation level of water management.

Water management is a critical factor in effective utilization of nutrients and the general level of management in irrigation project areas can make a difference of 800 to 900 Kg/ha., a substantial return for improved management.

As a part of thesis research for Mr. B.P. Upadhyaya, blast screening nurseries were conducted at four places - Khumaltar and Palung in the Hills and Parwanipur and Tarahara in the Terai. Infection levels were high enough in all places to enable reliable differential scores to be obtained. With this information it should be possible to determine race patterns that prevailed in those sites. Screening was also possible for new progenies in the breeding programs so that resistant selections could be made for further evaluation of yield and other characteristics.

Mr. Gopal Rajbhandary emphasized that by having more clearly defined objectives in the maize program it is possible to structure the research program to achieve these objectives.

The maize program has shifted emphasis in selection of progenies in areas where the ultimate varieties are to be grown by farmers. Progenies from different populations were grown at five locations in the Hills and the staff visited these locations to make selections which could be recombined in the winter season at Rampur. Selections for downy mildew resistance were made at Farm Suwan in Thailand in two populations of improved varieties. Disease pressures at Farm Suwan are created by growing susceptible

spreader rows in advance of the test material and inoculating these susceptible plants to generate a heavy build-up of inoculum.

Another change in program was to set up agronomic trials to evaluate farmers' cultural practices in comparison with the recommended practices. Methods of sowing and interculture were studied at Rampur and in farmers' fields. At existing levels of fertilization and yield performance the results were inconclusive but would indicate differences were not as critical as might be expected.

Arun-2 is a new early yellow maize variety that has been developed by the NMDP through three cycles of mass selection and 3 cycles of half sib selection at Rampur utilizing two crop seasons per year. This variety was extensively tried in different agroclimatic conditions throughout the Hills and the Terai. Its yield was generally substantially above the local variety which was in most cases another early variety. The local variety was generally about 7 days later than Arun-2. In the Hills it was as much as 20 days earlier than Rampur Composite. When the yields are calculated on a per day basis Arun-2 showed a significant increase over Rampur Composite.

Farmer reaction to Arun in the FFTs was generally very favorable because of the earliness of the variety.

Arun is visualized by the Cropping Systems team as a good maize variety to be used in the following patterns and situations a) Spring maize-rice-wheat, b) Maize-maize (Arun) fallow, c) Winter maize and d) Late planted situations.

The wheat crop was established after the beginning of this semiannual reporting period and was approaching harvest in the

Terai as the period ended. Leaf rust was again at high levels in RR 21 in Terai fields although it may not have been as severe this season as in the 1980-81 season. Farmers have begun to recognize the problem and indications are that plantings of UP 262 had increased, often to the limit of the seed available. This will help reduce the threat of a real leaf rust epidemic which could seriously affect wheat production.

Sterility continues to cause yield losses in certain areas and in some varieties. It would appear that waterlogging of UP 262 can increase sterility. However, at Khairenitar Farm, under conditions of good drainage, sterility was maximum in the trials grown there. It was encouraging to see UP 262 and RR 21 comparatively less damaged than many of the new selections. This site should be considered a "hot spot" by research teams and utilized for screening purposes to identify selections tolerant if not resistant to the sterility phenomenon. Tarahara has similar sterility problems but not to the extent which occurred at Khairenitar.

Of greatest significance for the wheat crop this period was the development of the research outreach program. The on-farm trial program was initiated under the new research outreach program with the 1981-82 wheat season. There were over 60 different trials in the 4 district for which the station is responsible. The greater concentration of these was in Rupandehi district. Categories of trials included:

1.	Farmer Field Trials - Regular	25
2.	Farmer Field Trials - Rainfed	12
3.	Crop Rotation - Rice-Wheat-Mungbean	8
4.	Management Minikit	9

5.	Demonstration of optimum use of fertilizer on late-sown wheat	4
6.	N-P-K trial	2
7.	No-tillage demonstration	4

In addition the Cropping Systems Program included one pattern (rice-rice-wheat) at two locations with 5 farmers each, bringing the total to about 75 trials.

Fourteen of these were visited on 11 and 12 March. A number of these will provide excellent information. In order to handle these trials the station has designated an acting Class II officer to be overall responsible and one additional officer for each district. In Rupandehi a JT was also assigned.

Approximately 60 percent of the time of these five officers and one JT are spent in farmers' fields. In addition every Monday is to be a field trip so other officers go along to observe trials or the research outreach officers go to different locations.

As a part of the pattern program, 6 quintals of Pusa Baisaki have been procured for distribution to farmers, not only in tubewell areas but other areas as well.

At the research station, the need to identify a variety or varieties to replace RR 21 has been met by a better organized varietal evaluation system.

The wheat team has made good progress in identifying new rust resistant selections. This year was the first year that an artificial epidemic of leaf rust had been created at Bhairawa Farm. Instead of relying on natural infections at Rampur or elsewhere, inoculation created rust in epidemic proportions. As

a result it was possible to determine with some degree of certainty those selections which had some resistance and to discard with confidence those which showed susceptibility. Several of these selections will be ready to move into more advanced trials in 1982-83 and future years. Considering the time required for varietal identification the wheat team should be looking for replacement for UP 262 as well as for RR 21.

The breeding program is more systematically developing new lines through the local breeding program and by introducing F_2 materials from CIMMYT to grow and make selections. This year over 900 progenies in F_3 to F_5 generation were under observation and advancement. Advanced lines numbered 249 and many looked promising enough to advance to yield trials in 1982-83. New crosses exceeded 1000. Many local varieties were being crossed to UP 262 and Lumbini to get dormancy, drouth resistance and other desirable characters from the local varieties.

One activity which is accelerating the development of new breeding material is the summer planting at the potato station at Ngale. It has not only been a means of advancing generations but effective selections can be made for rust and agronomic characteristics. The potato program must rotate with other crops to avoid some of the potato diseases so the rotation with wheat is mutually beneficial.

Field plantings were reviewed on the station on 10 and 11 March. The seed multiplications are generally good to excellent. In addition to multiplication of foundation seed of released varieties, a systematic multiplication of new varieties in variety trials will enable an acceleration of these varieties into FFTs and minikits. Roguing had been carried out and fields were especially free of off-types.

The seed production program has benefitted by the shift to earlier varieties of rice in the monsoon, better seed bed preparation and water management. Agronomic trials in progress included the long term fertility experiment where FYM was again going to produce the best yields. In addition to response to N and P, Potash was providing some improved production. A rate x date of seeding trial was of interest and will show some interaction of rates with late seeding although they may not be significant. The rotation plots were of some interest with differences in wheat yields expected following different crops like groundnut or rice. Growth seemed poorer after groundnut.

A chemical weed control experiment was of no value because weeds were not a variable since weed population was too low.

Late sown trials of the AVT were a good feature so as to identify varieties that might do comparatively better in late sown conditions. Fertilizer rates in upland conditions were disappointing since overall growth was poor and responses also poor.

A demonstration planting added to the value of the wheat plots for visitors - administrators, farmers, and extension staff. One of these was no-till wheat which was going to produce very satisfactory yields.

V. TRAINING

The extension of the project assured funding for the completion of the academic programs already initiated and to allow the remaining three trainees to initiate their programs at the University of the Philippines, Los Banos. Two others selected for MSc degree programs in India and to be funded directly by USAID funding are yet to be placed. Eighty percent of the degree programs will be undertaken outside of India instead of 50 percent as originally planned. Of this eighty percent twenty eight percent will obtain degrees in the Philippines and Korea. Linkages with international institutes has provided an opportunity for seven students to be guided by staff at IRRI while getting degrees at UPLB and one guided by the staff at ICRISAT while getting a degree at the Punjab Agricultural University.

During this period three additional degree candidates successfully completed their degrees and returned to Nepal to rejoin their respective programs. These were Dr. J.R. Baral, Extension; Mr. D.N. Chaudhary, Agronomy; and Mr. K.K. Lal, maize breeding.

In non-academic training, two maize production trainees attended the 7-month program at CIMMYT. A special two-month program at CIMMYT on Plant Protection Breeding in Maize was organized for three staff members of the NMDP, two financed by the project.

A detailed summary of academic and non-academic training is presented in Table 4.

In-country training included a special training program at Parwanipur for Field Plot Experimentation in Rice. The course

was conducted by Dr. Doug Neeley. Dr. Neeley also conducted training in statistical analysis for the socio-economic group.

Other special training programs included training for establishing preproduction verification as already mentioned under production programs. More than 60 persons in extension received training.

VI. TECHNICAL SERVICES

With the Phase II of the project the number of resident specialists was reduced to four. S. Samoto continued to the end of the year and his contract period of two years.

Kenneth D. Sayre, who had been agronomist in the maize program, transferred in October to the Cropping Systems Program as agronomist.

I.C. Bolo, who has had vast experience in implementing production programs in the Philippines and in Pakistan, joined the staff as production specialist in November to assist in this phase of the ICP and the Departments production programs.

The summary of resident specialists, Peace Corps Volunteers and consultants is presented in Table 5.

VII. CONSTRUCTION AND OTHER CAPITAL DEVELOPMENT

Various components of the construction program were nearing completion or were completed. These are summarized in Table 6.

Land shaping was not extended further during this dry season because of lack of manpower and no consultant was programmed to assist in this phase.

The irrigation development at Khumaltar was reviewed and a proposal developed to have a lift irrigation system to be jointly funded by ICP funds and funds from the Swiss assisted Potato Development Program. This is programmed for the next HMG fiscal year.

The residual rupee moneys (Rs. 2,440,297) out of Rs. 20,703,904 for the project have been reallocated and hopefully these will be expended during the next fiscal year.

VIII. LOGISTIC SUPPORT FUNDING

These funds are coming from dollar funds in the project and expenditures against budgets are presented in Table 7.

Table 1: Pilot Pattern Production Programs During the Wheat Season, 1981-82

Pattern	Location	No. Farmers	Area - ha.	
			Total	Per farmer
Rice-wheat-fallow	Lele, Lalitpur	47	5.5	.12
Rice-wheat-fallow	Pumdi Bhumdi, Kaski	18	6.0	.33
Rice-wheat-mungbean	Masiyani, Parsa	8	2.5	.31
Rice-rice-wheat	Persauni, Parsa	7	2.2	.31

Table 2: Pilot Production Expansion Areas

Area	Project	Dist No.	1981-82	1982-83	1983-84	1984-85
Rapti Zone	RAD	5	PPVT	25	300	1500
Karnali-Bheri Zone	K-BIRD	2	-	PPVT	25	300
Gandaki Zone	HFP/RCU	4	-	PPVT	200	900
Kosi Zone	KHARDIP	3	-	PPVT	50	200
Bagmati	IHDP	2	-	PPVT	25	300
Eastern Terai	Morang Irrig Project	2	-	PPVT	200	1000
Central Terai	NZIP	3	PPVT	15	150	1000
Lumbini Zone	Ground Water Project	1	PPVT	PPVT	100	300
Miscellaneous	AERP	8	-	PPVT	300	1400

Table 3: Results of Cropping Pattern Trials at Seven Sites, 1980-81
(Adapted from "Progress Report, Problems and Future Plan, Nepal 1981," in Proceedings Cropping Systems Working Group Meeting, Burma, 1981)

Site	Traditional Patterns (TP)	Promising Patterns	Yield (T/ha)* Crop 1	Crop 2	Crop 3	Total	% of TP	Marginal Benefit-Cost Ratio
Khandbari	Rice-fallow-fallow		2.30	-	-	2.30		
		Rice-fallow-fallow	3.81	-	-	3.81	165	6.43
Lele	Rice-wheat-fallow		1.90	1.43	-	3.33		
		Rice-wheat-fallow	4.85	2.08	-	6.93	208	4.98
Pumdi Bhumdi	Rice-wheat-maize		1.72	1.24	2.06**	5.02		
		Rice-wheat-maize	4.98	1.25	2.46**	8.69	173	3.88
Chauri Jahari	Rice-maize-wheat		1.90	1.90	2.00	5.80		
		Rice+maize-wheat	1.86	2.84	3.11	7.81	390	4.66
	Rice-wheat-fallow		2.89	2.87	-	5.76		
		Rice-wheat-fallow	4.19	3.17	-	7.36	127	2.57
Parsa (Irrigated)	Rice-wheat-fallow		2.00	1.70	-	3.70		
		Rice-maize-maize	NA	7.42	3.91	11.33	306	NA
Parsa (Rainfed)	Rice-fallow-fallow		1.40	-	-	1.40		
		Rice-wheat-fallow	3.71	2.18	-	5.89	420	2.76
Ratna-Nagar	Maize-mustard-fallow		2.56	0.34	-	2.90		
		Maize-maize/wheat	2.88	3.92	2.52	9.32	321	2.07
	Rice-wheat-fallow		2.20	2.00	-	4.20		
		Rice-wheat-maize	2.46	1.80	2.58	6.34	163	3.39
		Rice-wheat-mungbean	2.95	2.16	1.26	6.37	152	2.46

* Yields for traditional patterns are averages for 1979-80

** Hail damage reduce yields

NA Data not available

Table 4: Training and Other Participant Programs
October 1981 - March 1982

TYPE OF TRAINING		No.		Total Man Months
A.	Long Term			
	Through September 81	54		224
	This period			
	CIMMYT, Maize Production Training	2		
	Mr. Ram Briksh Prasad		7 mo	14
	Mr. Ram Prasad Uprety		7 mo	
	CIMMYT, Maize Plant Protection Breeding	2		
	Dr. Keshari L. Manandhar		2 mo	4
	Mr. Bhimsen K.C.		2 mo	
		58		242
B.	Study Tours, Workshops etc.			
	Through September 81	81		33.10
	October 1981 - March 1982	1		.13
		82		33.23
C.	Degree Programs			
	Completed to September	9 MSC		
	Completed October 81 - March 82	2 MSc		
		1 Ph.D		
	Continuing	17 MSc*		
	Continuing	3 Ph.D*		
	Newly initiated this period	3 MSc		
	To be initiated**	2 MSc		
	Cancellation	1 MSc		
	Total	35		

* Includes 2 M.Sc and 1 Ph.D in India directly funded by USAID.

** Includes 2 to go to India under direct funding by USAID.

Table 5; Technical Services Supplied by IADS, CIMMYT, RF and Peace Corps to date and from October, 1981 thru March, 1982

A.	STAFF	Joined	To	Total Person Months Thru Sept 1981	Oct. 81 thru Mar. 82	Total
	I. C Bolo	Nov 1981	Continuing	-	5	5
	Wayne H. Freeman	Oct 1976	Continuing	60	6	66
	Marlin V. Van Der Veen	Oct 1977	Continuing	47	6	53
	Kenneth D. Sayre	Mar 1980	Continuing	18	6	24
	S. Samoto	Jan 1980	Dec 1981	21	3	24
	A. Hugo Manzano	Mar 1977	July 1981	53		53
	Eduardo R. Perdon	May 1977	June 1981	50		50
	M. Akram Khan	Apr 1979	July 1981	27		27
	Robert L. Beacher	Oct 1979	Mar. 1980	12		12
	Donald R. Schmidt	Mar 1976	Feb. 1979	24		24
	Man Hue Heu	Jun 1977	Dec. 1979	24		24
	Robert F. Schroeder	Mar 1978	Dec. 1979	24		24
	Torey Lyons	Mar 1976	May 1977	15		15
				375	26	401
B.	PEACE CORPS					
	Sanford Smith	Oct 1980	Continuing	12	6	18
	Patty Smith	Oct 1980	Continuing	12	6	18
	Tim Lang	Oct 1980	Continuing	12	6	18
	Shane Philips	Oct 1980	Continuing	12	6	18
	Duane McClain	May 1980	Mar. 1982	15	6	21
	Cathy McClain	May 1980	Mar. 1982	15	6	21
	Tim Kelly	Aug 1977	Apr. 1978	9		9
	Craig Smith	Aug 1977	June 1978	11		11
	Tom Morris	Aug 1977	July 1978	24		24
	Karen Dingler	Oct 1977	Sept 1979	24		24
				146	36	182

C. CONSULTANTS AND OFFICIAL VISITORS

	Persons	Person Months
Total to date	119	49.0
This period		
Doug Neeley	1	1.0
D.S. Athwal	1	0.1
	121	50.1

Table 6: Summary of Construction Activities under the Integrated Cereals Project

Activity	Status March 31, 1982
PARWANIPUR	
Office/Lab	Completed
Threshing Shed	Completed
Seed Plant/Storage	Completed
Workshop	Completed
Advisor's Quarters	Completed
Greenhouse	Completed
Generator House	Not started
RAMPUR	
Office/Lab + Threshing Shed	95% complete
Advisors Quarters	Completed
Farm Water Supply	Well drilling initiated
Farm Electric Supply	90% complete
Seed Plant/Storage/Generator House	85% complete
Officers Quarters	Completed
Staff Quarters	Completed
Workshop	Not started
BHAIRAWA	
Office/Lab	Completed
Staff Housing	Completed
Workshop	80% Remaining
Training Center	Cancelled
Seed Plant/Storage	Completed
Generator Shed	Completed
Soils Laboratory	Furnishings to be completed
HILL STORAGE	
Daman	Completed
Kakani	Completed
Jumla	Completed
Jiri	Completed
Doti	Completed
Dhankuta	Completed
KHUMALTAR - Cropping Systems Building	Cancelled

Table 7: Local Currency Expenditure for Six Months - October 1981 to March 1982

Budget Line	Budget	Expenditure up to 31 March 1982	% of Budget	Balance
Local staff support	700,000	275,779.05	39.4	424,220.95
Vehicle operation and maintenance	300,000	175,439.79	58.5	124,560.21
Local travel and per diem	370,000	182,700.02	49.4	187,299.98
Language instruction	20,000	-0-	-0-	20,000.00
Office operation	376,600	166,963.80	44.3	209,636.20
Equipment and supplies	225,000	82,284.72	36.6	142,715.28
Insurance	60,000	46,049.00	76.8	13,951.00
Local in-service training	23,000	7,351.70	31.9	15,648.30
Housing	250,000	220,378.38	88.2	29,621.62
Contingencies	100,000	-0-	-0-	100,000.00
Total	Rs. 2,424,600	1,156,946.46	47.7	1,267,653.54