# Pre-Production Verification Trials in Nepal

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## LIST OF ACRONYMS

| | | |
|---|---|---|
| AADO | = | Assistant Agricultural Development Officer |
| ADO | = | Agricultural Development Officer |
| AERP | = | Agriculture Extension and Research Project |
| AIC | = | Agricultural Inputs Corporation |
| B | = | Barley |
| CS | = | Cropping Systems |
| CSP | = | National Cropping Systems Program |
| DADO | = | District Agricultural Development Office |
| FM | = | Finger Millet |
| Ha | = | Hectare |
| ICP | = | Integrated Cereals Project |
| IRDP | = | Integrated Rural Development Project |
| JT/As | = | Junior Technician or Junior Technical Assistant |
| KHARDEP | = | Koshi Hills Area Redevelopment Project |
| M | = | Maize |
| MBCR | = | Marginal Benifit Cost Ratio |
| MT | = | Metric Ton |
| Mu | = | Mustard |
| NPK | = | Nitrogen, Phosphorous, Potash |
| PVT | = | Pre-production Verification Trial. Throughtout the Asian Cropping Systems Network also known as Multilocation Testing Trials. Sometimes "PPVT" is the acronym used for PVT. |
| R | = | Rice |
| RCUP | = | Resource, Conservation and Utilization Project |
| VP | = | Village Panchayat |
| W | = | Wheat |
| "-" | = | As in Rice-Wheat represents a sequence crop in a cropping pattern |
| "/" | = | As in M/FM-W represents a relay crop in a cropping pattern |
| " + " | = | As in M - Chickpea + Mustard represents a combined crop in a cropping pattern |

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## LIST OF TABLES


| TITLES | Page No. |
|---|---|
| List of Acronyms | i |
| Table of contents | ii |
| Foreword | 1 |
| Introduction | 2 |
| Overview of 1982/1983 CSP-PVT Activities | 4 |
| Problems and Suggestions | 7 |
| Preface to the Summaries of Agronomic and Socio-Economic - Results | 10 |
| Summaries of Agronomic and Socio-Economic Results: | |
| 1. Rapti IRDP PVTs | 14 |
| 2. Kaski District PVTs | 19 |
| 3. AERP and Other Terai PVTs | 25 |
| 4. RCWP PVTs | 28 |
| Preface to the Tables of Agronomic and Economic Results | 31 |
| Tables of Agronomic and Economic Results | 35 |
| References | 65 |
| Preface to Appendices | 66 |
| Brief Discussion of Site Description | 67 |
| Appendix 1: Site Description Questionnaire for PVTs | 68 |
| Appendix 2: Blank Data Summary Sheet | 74 |
| Appendix 3: Data to be Collected from PVT Form | 75 |
| Appendix 4: Detailed Outline of PVT Methodology Training - Program | 78 |


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# Pre-Production Verification Trials in Nepal*

## Foreword

There are many approaches and programs for agricultural development currently being used in Nepal. The National Cropping Systems Program (CSP), which has been working since 1977, has developed one approach that has shown good success. Developing sets of recommended agricultural technology** for several carefully selected environments in the Terai and mid-hills of Nepal, was CSP's initial priority. These technologies are now ready and available for more widespread extension to similar environments in Nepal.

One of the methods used by CSP to extend these recommended technologies is the Pre-Production Verification Trial (PVT). This report includes the cumulative results of the 1982/83 PVTs, and also provides some of the "tools" necessary for proper conduct of PVTs;i.e., detailed outline of PVT Methodology Training Program, Data to be collected from PVTs form, modified site description questionnaire, blank data summary sheet, and overall explanations designed to assist agricultural development officers and others to better understand the "why, where and how to conduct PVTs".

Three other major Cropping System's reports on PVTs in Nepal have already been written. This report basically follows the format and recommendations of these, plus heightens the modifications and problems that have occurred while actually conducting PVTs in Nepal. For an analysis of the results of previous PVTs which started from

* Report prepared for the 11th Summer Crops Workshop held at Parwanipur Agricultural Farm from January 30 to February 5, 1984.

** Many reports have already been written on the Cropping Systems Program and Approach in Nepal. For more information, please refer to these reports available from the National Cropping Systems Program at Khumaltar Agronomy Farm. However, the reader should note here that the research to develop cropping systems technology occurs on farmers' fields with farmers full involvement, and on a cropping pattern basis.

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1980/81, please refer to "Pre-production Verification Trials, 1981 Spring and Summer Crops" and "Pre-production Verification Trials, 1981/82 Winter, Spring and Summer Crops"; and for the most in-depth presentation on how to conduct PVTs, read the "Guidelines for Pre-production Verification Trials of Cropping Systems Recommendations," all jointly written by CSP staff. Also, presently CSP is conducting a PVT Evaluation Program, scheduled to be completed by March of this year. Six sites are being evaluated to determine how successful or unsuccessful, PVTs have been. Evaluation will focus primarily on the level of adoption by farmers of recommended technology.

## Introduction

Stated briefly, PVTs are a form of result demonstration trials used by CSP to extend researched cropping systems technology into suitable areas. They are essentially pre-production, meaning they are used before promoting larger area production programs. Their primary purpose is to introduce and then test recommended technology* in appropriately selected areas where little, if any adoption of improved technology has already occurred. Because these trials are conducted in farmer's fields alongside farmer's traditional practices, one of the major benefits of PVTs is the ability to determine and compare by how much and why the recommended technology is agronomically and economically superior, or not superior, to farmers' practices.

It is important to note here that PVTs are designed to be flexible enough to accomodate and absorb the realities of local conditions. For instance, if a particular site is far enough away from easy access to chemical fertilizer, then in all likelihood it may be prudent to reduce

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* In most cases the package of "recommended technology" for PVTs in Nepal mainly consists of a new variety, rates of chemical fertilizer and seed application, all on a cropping pattern basis.

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the recommended dose of chemical fertilizer and, in some cases, we have done this, after consultation with DADO and CSP research staff. Further, PVTs conducted especially in remote areas, should not be considered as a substitute for component technology studies and, in fact, are complementary. Variety and fertilizer trial results, in particular, from the same areas can be most useful in developing sets of integrated or cropping systems recommendations for a targeted PVT or pilot production program site.

CSP production campaign work already completed in hill areas has clearly demonstrated the difficulty of relying on and moving chemical fertilizer into even moderately remote areas of Nepal.* Where and why PVTs have proven particularly useful for Nepal's conditions, is related to this continuous problem of remoteness: PVTs, being small-scale but integrated, and midway between research and extension, offer a dynamic, workable avenue for reaching many remote areas of Nepal with a package of improved technology at relatively little expenses. At the same time, they allow ADOs and others involved in agricultural development, an opportunity to learn how to manage and develop technologies to recommend for future larger scale production programs in their areas. Questions such as "who is responsible for arranging inputs availability, and at what time?" are not easy to address. Since the technology to recommend, research or develop for remote areas is directly related to these questions, initial small-scale local approaches to development like PVTs are more appropriate and feasible.

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* See the recent, November 1983 report by Inecencio C. Bolo, "Cropping Systems Pilot Production Program in Nepal," esp. pp, 14-16. One of CSP's staff based in Chauri Jahari, Rukum District actually calculated that it would take hundreds of mules hauling bags of chemical fertilizer every day of the dry season just to meet a part of the requirements needed for conducting a 500 hectare, double crop production program based on CSP's recommended rates of chemical fertilizer application.

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However, admittedly from the past two years experience, the utility of PVTs in Nepal has been clearly demonstrated only in areas where there has been, 1) a serious committment to use PVT as a targeted part of adaptive research work, 2) the methodology as developed by CSP has been followed in a stepwise manner, 3) permanent people have been assigned to follow through the trials, and 4) a perspective that Pre-production verification trials were being used to develop suitable recommendations for a larger scale production program. in a number of situations some or all of these four points were missing, and as a result, unsuccessful PVTs were conducted. The usefulness of PVTs, in these areas, as expected, has been very nearly nil.

Overview of 1982/83 CSP-PVT Activities

This past year has seen a major modification in the manner by which CSP has been involved in PVTs. Initially, CSP actually conducted the trials in the potential areas for extending and verifying cropping systems technology. Now the emphasis is being placed in assisting ADOs in certain districts or other defined development projects in developing their own abilities to conduct PVTs in their areas.

For this more localized approach, CSP has streamlined the PVT process to enable ADOs to more easily and more directly utilize the cropping systems research and extension approach. For instance, where before contral ICP-CSP staff conducted fairly detailed site description reports, we now have developed a shortened site description questionnaire for practicable use by ADO staff, designed primarily to gather the necessary data for completing a data summary sheet; where before we relied on the PVT instructions, training program schedule, questionnaires, etc. to be in English, they have all been translated into Nepali; where we initially required two sets of forms to be completed per trial, there is only one now; where we more or less insisted on local superimposed treatments based on site description findings, we now believe that local

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yield samples will be sufficient for comparison; where we previously conducted large training sessions at a central point, we now provide training at the particular district center sites; and so forth and so on.

Currently, the National Cropping Systems Program is working with the following groups in PVTs: 1) Kaski ADO, 2) RCUP in Myagdi and Gorkha Districts, 3) Rapti IRDP, 4) AERP, 5) Pakhrebas - KHARDEP, 6) Lumbini Groundwater Project, 7) Morang - Sunsari Irrigation Project, 8) Sagarmatha Rural Development Project, 9) Mahakali Irrigation Project, 10) Manusmara Water Utilization Project, and 11) Kailali Farm Water Irrigation Project. Several other projects are interested and plan to utilize PVTs in their adaptive research programs.

During the last year, the Integrated Cereals Project socio-economic group wrote "initial site description reports for pre-production verification trials" for 1) The Semari, Sundi and Belhiya Tubewell Command Area - Rupandehi Deistrict, 2) Mohammadpur Panchayat - Rautahat District, 3) Lipini Birta Panchayat - Parsa District, 4) Raniswara Panchayat - Gorkha District, 5) Jhee and Patlikhet Panchayats - Myagdi District, and 6) Narayanpur, Chailahi and Sishaniya Panchayats - Dang - Deukhuri District. Trials are now ongoing in each of these areas.

In 1983 about 100 JT/As, AADOs and ADOs from all the districts of Rapti Zone, plus Gorkha and Myagdi Districts received training given by a team of a CSP agronomist and economist. The training's main emphasis is to build individual technical skills to insure effective ADO and JT/A level field supervision of the trials. (See appendix four for a detailed outline of the PVT methodology training program) In addition to the training, repeated visits to ongoing PVT sites are also made by the CSP team to help further supervise the trials to correct any problems and thereby reinforce the methodology. From these visits and trainings,

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preliminary work plans and field trip reports are drafted to help provide continuity and better management of the respective trials.

Many of this year's new PVTs have been concentrated in the more remote hill areas of Nepal where only a small amount of inproved practices have previously been adopted or observed by farmers. Because these types of areas are ideally suited for PVTs, rather striking success is usually achieved. In several sites where after only one year of conducting PVTs, most of the farmers in the area and even in neighboring panchayats have started using the recommended varieties and some chemical fertilizer.

However, in some instances, while discussing the results of the trials, we have also found farmers to be still reluctant to adopt new varieties and recommended rates of chemical fertilizer application, even in cases where the recommended technology is much more productive. Some reasons given include the late maturity of new varieties such as Khumal Yellow maize, which causes disruption of Panchayat-wide traditions of open grazing; adverse affects by Khumal Yellow's thick leaves on relayed finger millet; a preferred taste for local varieties; and fear that chemical fertilizer will ruin the soil. Another constant reminder learned while working in Hill PVT areas has been the need for conducting research finger millet and in general, higher hills farming systems since there are few, if any recommendations for this important major crops and area of Nepal.

Also, many ADOs this year have used PVTs as part of their adaptive research programs and have arranged their extension activities to make better use of PVTs' results. These ADOs targeted and conducted farmers' field days in PVT panchayats and are encouraging the storage and exchange or sale of PVT produced seed. One ADO has stratigically placed fairly large information sign boards at each PVT plot, presenting in Nepali

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the variety used, the chemical fertilizer application and seed rate per ropani, etc. Combining such extension tools for demonstrating PVTs' results measureably enhances the spread of improved technology.

Problems and Suggestions

If you were to ask various staff engaged in agricultural development in Nepal "what are the major problems?", two recurrent answers would probably emerge: 1) A general absence of effective coordination/management/administration/communication; and 2) Unavailability of quality inputs on time. Both of these are understandable especially given the terrain and history of Nepal. And PVTs, being a small part of agricultural development in Nepal, are no exception, sice they too are plagged with the same problems. Specifically, major adiministrative problems - many of which are concomitant and historical-encountered while conducting PVTs are:

- Continuous transferring of trained personnel
- Lack of supervision of trials at the central and field levels
- Lack of training and trained personnel resulting in not following the prescribed methodology.
- Prerequisite initial site surveys not conducted
- Difficulty in collecting the required data
- PVTs considered an additional workload and/or chiefly ICP-CSP's work
- PVTs established in inappropriate areas
- Lack of complementary component technology studies
- Lack of development in finger millet
- Too many PVTs located in one area
- PVTs not initially targeted by ADOs, but still being conducted

Many of these problems are not new, and numerous suggestions have already been offered im many reports, including W.H. Freeman's appendix to the "Nepal Integrated Cereals Project Evaluation Report" (April 1983)

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entitled," Improving the Effectiveness of Agricultural Research in Nepal". But in particular, for PVTs to be run properly:

1) More trained research and extension personnel are needed, both at the central and field level,
2) Financial and administrative arrangements like official targeting should be done prior to the fiscal year,
3) A solid management information system, coordinated between field and central staff, would be most helpful to develop and manage the transfer and feedback of technology and results,
4) Reducing transfers of trained personnel would greatly assist the program in providing a necessary element of continuity,
5) Local site surveys and overall responsibility of the trials should be conducted with the full involvement of local staff,
6) Arrangements hould be made to reward those JT/As in particular who do good work,
7) Joint efforts with the commodity stations would be most helpful in developing appropriate technologies, especially in relation to joint component technology studies,
8) Flexibility especially at the district centers, should be built into the target-making process. For instance, if a target was found to be somewhat erroneously established, then the ADO should be delegated the responsibility to correct it, and
9) PVTs should not be conducted in areas where high levels of improved technology have already been adopted by the farmers.

For the second set of problems - the unavailability of quality inputs on time - one of two things can be done: 1) Continue to try to improve the existing AIC delivery system; or 2) Focus on developing local capacities for major inputs like seed and biological sources of fertilizer. The facts are that the technology exists for green manures but little research and extension work are being done on these crops; farmers have been applying compost for centuries, but efforts should

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be made to increase the efficiency, nutrient value and quantity of it; local home seed storage systems should be promoted throughout the villages of Nepal; and neglected crops like finger millet deserve more research and development attention. Numerous other suggestions could be offered, all dealing with the type of agriculture which has recently been termed "regenerative agriculture". And foremost specialists for this type of agriculture are obviously the farmers in the hills of Nepal.

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Preface to the Summaries of Agronomic and Socio-Economic Results

At harvest time for each PVT, a "data to be collected from PVTs" form (appendix three) should be properly completed in order to perform economic and agronomic analyses of the trials. Information on both recommended and farmers practices is needed for comparing the results to determine which practices are superior, why and by how much.

Undoubtedly, participant farmers' acceptance of the recommended technology should be considered ample justification needed to recommend a certain technology to other farmers in the area under similar land conditions. However, when recommending new technology, farmers want to know why the new technology is considered superior to what their forefathers had been doing for decades. If proper analyses of the trial had been performed, then extension and research workers can confidently tell the farmers "that after testing the technology here in this ward, such and such practices (either recommended, or farmers, or a combination) are better because..." Also, by interviewing the farmers and noting test specifications and comments of both recommended and farmers practices, the extension worker himself greatly benefits through a better understanding of the agricultural practices in his panchayats and those of national level researchers.

The thirty or so tables presented with this section of the report list the averaged results of this past year's PVTs, and where completed, of the total cropping pattern. Recommended practices are compared with farmers' practices to calculate gross returns, gross margins and marginal benefit cost ratios:

Gross returns are the price of output (Rs/Kg.) times the yield in kgs.

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Gross margin is the gross returns minus fertilizer and insecticide costs.

The Marginal Benefit Cost Ratio for Nepal's PVTs is a relative measure of how many rupees of increased production can be expected by a farmer who invests in the recommended technology compared to what he normally does. For instance, if a farmer applied 500 rupees worth of chemical fertilizer together with an improved variety to one hectare of land and received 8000 rupees in gross returns, while on his other hectare of land he used a local variety and no chemical fertilizer, and collected 5000 rupees in gross returns, his MBCR would be 6. Simplified, this means that at planting time, if 100 rupees of chemical fertilizer are applied with an improved variety, 600 rupees worth of increased production are realized at harvest time.

The formula used to compute an MBCR is:

$$\frac{\text{Gross Returns} - \text{gross returns}}{\text{TVC}_{RP} - \text{TVC}_{FP}} = \text{MBCR}$$

Where TVC (total variable costs) are the costs of chemical fertilizer, insecticides (and others where applicable)*

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* Note that all other factors besides chemical fertilizer and variety are usually considered equal when assessing Nepal's PVTs. These other factors, like labor and power costs are not included in the total variable costs because the recommended land preparation practices follow the farmer's practices; thus, they cancel each other out in the economic analysis. Only the extra labor involved in applying the fertilizermerits consideration, albeit minimal. See H.G. Zandstra et. al., A Methodology for On-Farm Cropping Systems Research (1981) IRRI, esp. pp. 62-68, for a more detailed presentation on the economic evaluation of cropping performance.

Also an obviously important consideration not mentioned in our very simplified example on MBCR is the risk to the farmer for investing resources in a new technology.

RP = Recommended practices

FP = Farmers practices

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The MBCR for each PVT in Nepal has been calculated and is presented at the bottom of each table. Generally, any MBCR greater than three* is considered as a solid enough indicator to suggest that the recommended technology is superior to farmers' for a particular area. But, as already alluded to, the reader is cautioned to recognize that many other factors are involved in farming systems of Nepal (like taste of grain, length of straw, quantity and quality of compost, disposable income, livestock grazing, even religious and other traditional considerations, etc.) which influence farmer's decisions on which technology to adopt. An MBCR is only an economic indicator, and it alone is not sufficient proof to recommend new technologies to farmers; along with the MBCR, the "other factors" must be considered.

This year we collected data on PVTs from over 500 farmers from diverse areas throughout Nepal. One hundred and thirty MBCRs are calculated in this report: 70% are three and above, 11% are below three, and the remaining are undeterminable or negative. Of the 70% three and above, about 17% border three, 55% are between four and ten, and the remaining 28% are greater than ten. Obviously, the greater the MBCR, the more assurance there is that the recommended technology is superior to farmers' practices, and that the farmer can and will adopt the recommended technology. However, MBCRs that approach 15 or more can leave the researcher skeptical or suspicious that the data was improperly collected, or the methodology was not followed. (About fifteen of the MBCRs are greater than 15.)

The reasons why some MBCRs could not be calculated or are negative or infinite, are because the figures collected for variable costs or gross returns for local practices, are sometimes the same or greater

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* Zandstra et.al, already mentioned, "(Three) is a rule of thumb based on the experience of cropping systems researchers." p.63.

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than recommended practices; or, some of the necessary information was not collected. For the former cases, PVT methodology evidently was not properly followed, since PVTs are designed for wards and panchayats where little, if any, adoption of improved varieties, chemical fertilizer, etc., has already taken place.

With the information we have collected and analyzed, and from the experience gained through supervisory site visits, over the past two years, we can reasonably assert that CSP-recommended technologies on a national level, have significantly and consistently outperformed local practices; and that the technologies are now ready for more widespread promotion and adoption in those area where PVTs have proven successful. In fact, the national level average MBCR is about 7.5.

Summaries of Agronomic and Socio-Economic Results

The following brief summaries are district specific analysis of the agronomic and socio-economic results of the 1982/83 PVTs.* Also included is some data from the 1981 PVTs which had not previously been reported. For more detailed information on each replication and PVT the reader is asked to refer to the original "data to be collected from PVTs" forms and various field trip reports by David Lipinski and

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* Some researchers conservatively claim that two to three full years of monitoring per PVT are necessary before safely recommending the technology for more widespread extension through pilot production programs. Given the food deficit conditions facing Nepal's more remote villages, and seeing the farmers oftentimes enthusiastically accept the recommended technologies after only one year of trials, demonstrates that in some cases, PVTs can be graduated into pilot production programs even after only one year of testing. This is especially true in areas where considerable care was given to describe the pre-PVT conditions so that appropriate cropping systems technologies could be recommended.

Also, note that many of the PVTs in Nepal have been on-going for at least one to two years.

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P.M. Shrestha, most of which are with CSP at Khumaltar, or with the respective ADOs.

I. Rapti Integrated Rural Development Project (IRDP) PVTs**

1. Dang District

i) Amritpur VP (Tables 1 & 2)

Two completed cropping patterns, R-W and M-Mustard, plus a M-Chickpea + Mustard pattern. Improved varieties of rice performed especially well. Even though Kanchan and K39 took 126 and 99 days respectively from planting to harvest, while local varieties took 133, they both outyielded the local variety by 1-2 MT/ha. MBCRs, 4.5 and 7.0 for total cropping pattern results of the R-W pattern are strong enough to recommend over local practices.

M-Mustard pattern did not perform as well, one reason being the poor germination of AIC Rampur Composite seed which contributed to a poor plant population. Mustard crop was basically a fertilizer trial, demonstrating the cost effectiveness of a 20:20:0 rate of chemical fertilizer application per hectare. The very high dose of chemical fertilizer, including potash, on the maize crop in the M-Chickpea + Mustard pattern, yielded comparitively little as the MBCR is only 1.1.

ii) Chilahi VP (Table 3)

Same two patterns tested as above, R-W and M-Mustard + Chickpea. All of the wheat data was not collected, but Chandina rice yielded well at 4 MT/ha, with a 60:30:30 (NPK kg/ha) dose. Also, the days from planting to harvest for Chandina and the locals were both

** Most of Rapti IRDP PVT analyses and data come from Sandy Smith, cropping systems specialist for the project. For more detailed information on Dang, Salyan, Pyuthan, Rolpa and Rukum District PVTs, please contact the project or the respective ADOs.

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143. Rampur Y. with an 80:40:30 (NPK kg/ha) dose did not significantly outperform Rampur Composite.

iii) Laxmipur VP (Table 4)

Two cropping patterns tested, R-W and M-Chickpea + Mustard, with the former having a solid 5.5 MBCR. UP262 yielded close to 3.5 MT/ha at 80:40:0 NPK/ha. Chandina, under continuous irrigation conditions, yielded 4.25 MT/ha, and took 14 fewer days to mature (122) then the local variety. Due mostly to Chandina's superior yield, the R-W pattern has a recommendable MBCR of 5.5. For the second pattern, Rampur Comp. yielded close to 6 MT/ha, with only 84 days from planting to harvest.

2. Salyan District

i) Dada Gaon VP (Table 5)

M-W and R-W tested for this hills panchayat. Khumal Y. at 60:30:0 NPK kg/ha yielded only 2.8 MT/ha. But for R-W, UP 262 and Kanchan both performed very well for a combined yield of 8.21 MT/ha compared to locals at 5.14. As expected, the MBCR for R-W is a strong 8. Also, Kanchan and the local rice, Tharuwa, both took 127 days from planting to harvest. Irrigation was very good for both crops.

ii) Chiyachetra VP (Table 6A, 6B and 7)

R-W with three different rice varieties and two different fertilizer rates, was tested in 20 plots. K39 was superimposed on a 50m$^2$ trial area. No major difference in the rice varieties as all performed reasonably well. However, UP262 yielded more than 3.5 MT/ha compared to 2.16 MT/ha for a local variety of wheat. Note also the major difference in compost application for local vrs. recommended practices.

M-W, under upland conditions, also tested, with Kh. Y. again performing poorly. Improved wheat UP262 and RR21 at 60:30:0 NPK/kg/ha outyielded local varieties by about 1 MT/ha. Note also the

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vast differences in compost application, with local receiving 24 MT/ha more than recommended practices. Due to Khumal's relatively lower yield, the MBCR is not great enough to merit recommendation of the M-W pattern.

3. Pyuthan District

i) Bijayanagar/Daksquadi VP (Table 8)

R-W and M-Barley tested. UP262, based on farmer's estimates doubled NL-30's yield of 1.9 MT/ha, although four times more chemical fertilizer was applied to UP262. Both Khumal Yellow and Bonus Barley yielded less than the locals, again based on farmer estimates.

Poor seed quality and low vigor was noticed with Khumal Yellow.

ii) Bijuwar VP (Table 9)

R-W on lowland, and M-Barley on upland were tested. Sabitri and Janaki (at 6 MT/ha) outyielded Marci by 2-3 MT/ha, using 60:0:0 NPK kg/ha. Again, Kh. Y. and Bonus Barley yielded less than local varieties, even though a combined rate of 65:20:0 was applied to recommended practices.

4. Rolpa District

i) Libang VP (Tables 10 & 11)

In the R-W pattern, high levels of sterility were noticed in UP262, a problem that was not encountered the previous year. Kanchan again performed very well, yielding an average of 5.88 MT/ha with only 46:0:0 NPK kg/ha applied; plus it recorded the least number of days from planting to harvest at 142, compared to Himali with 159 and Local Marci at 156.

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With some compost and only 30:0:0 NPK kg/ha applied to Khumal Y., it yielded over 5 MT/ha in the M-W PVT. RR21 performed much better than UP262, yielding almost 3 MT/ha, one more than for the latter variety which has sterility provlems in Libang VP. Relatively low rates of chemical fertilizer were applied to both crops, but RR21 combined with Kh.Y. yielded 8 MT/ha and recorded over 30,000 rupees in gross margin and 12 in the MBCR.

ii) Jankot VP (Tables 12A, 12B &13)

R-W, with four different varieties of improved rice, and three rates of chemical fertilizer, was tested in 25 plots. The highest MBCR (20) was recorded for the UP262-Kanchan cropping pattern using a combined 86:20:0 NPK kg/ha. All of the improved combinations are recommendable over the local practices. Also Kanchan matured seven days quicker than Thaichung, and yielded more than 5 MT/ha, almost twice as much as Thai. A pilot production program is now being run in M-W, since Kh.Y. at only 30:0:0 NPK kg/ha yielded a solid 3.83 MT/ha. Because the price of food grains is very high in Rolpa, high gross returns and margins cause the MBCRs to also be abnormally high.

5. Rukum District

i) Chibang VP (Tables 14, 15 & 16)

Data from 1981/82 PVTs is also included here, R+M-W, and R-W-Mung are the tested cropping patterns with both measuring sound MBCRs at 4.4 and 12 respectively. All improved varieties, using chemical fertilizer, recorded significantly higher yields than locals, with Janaki rice averaging 5.2 MT/ha to combine with UP262 for a 9.51 MT/ha total cropping pattern yield (not including the mung at .43 MT/ha). Note that mung is a new crop for the area which the farmers liked and intend to plant again; 11Rs/kg is the price of mung in Rukum.

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For the Rice+Maize-Wheat trial, Arun maize took 110 days to mature, while Bindeshwari, 127. Both signifiacntly outyielded the locals, which also took identical numbers of days to mature. 80:40:0 NPK kg/ha is probably too high a rate to apply on wheat, especially considering the remoteness of Rukum, and the compost already applied. NL-30 in 1981/1982 yielded 4.8 MT/ha with 48:30:0 NPK kg/ha applied, and in 1982/1983, RR 21 at 80:40:0 NPK kg/ha yielded only 3.56 MT/ha.

For remote areas of Nepal where access to inputs in difficult, lower rates of chemical fertilizer should be tested with compost application, rather than rely on high doses of imported chemicals. Pilot Production Programs have already begun in a number of these Rapti Zone PVT listed Panchayats, namely Jankot, Dadagaon and those in Dang. CSP also has a remote hills research site in Rukum District at Chauri Jahari. Perhaps some of the best post-research cropping systems work is being done through Rapti IRDP, especially for the food deficit hills of Nepal. Several obvious reasons why the cropping systems program is successful in Rapti Zone are because of the constant supervision and coordination of the trials, trained personnel. (some of the trainees this year received their third training in PVT methodology and have not been transferred yet), and because of the full involvement by ADO staff in project works.

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## II. Kaski District Agricultural Development Office PVTs*

Kaski District is one of the first sites where PVTs were started in Nepal. Detailed site descriptions were completed for all four panchayats. Several PVT methodology trainings have been given to the JT/As and officers. One of the panchayats, Gachok, has been a model of PVT success, mainly because of the permanent JT living and working there. Necessary sustained committment through follow-up and regular supervisory visits to farmers' fields have been given by ADO and CSP staff. The ADO for a time kept one JT at the district center to be largely responsible for field supervision of the trials. Farmer's field days, attended by central and local staff, have usually been conducted at harvest time for each crop in each panchayat. Dhaincha was planted between the maize crop at three panchayats where rice will follow maize, but it was badly damaged by hailstorms. Three of the four originally trained JT/As have not been transferred, providing continuous field level technical know-how for the trials.

Even though PVTs were not previously scheduled for extension into other Kaski panchayats, the ADO and CSP jointly gave PVT methodology training to 15 more JT/As to assist them with their technical work. And as part of the attempt by CSP to develop a transferable (easily acceptable to ADOs) site description process, CSP and Kaski ADO staff worked together to complete five site descriptions for those panchayats covered by the Rewa Tal Watershed Project. In addition to targeting five PVTs for this project, the ADO plans to start two more in Kaski. After harvest of this year's wheat crop, PVTs for Kaski's four panchayats will be completed, and production programs are scheduled to begin.

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* More detailed information on Kaski PVTs is available from the Kaski DADO, participant farmer and respective JT/As.

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i) Rakhee VP (Table 17)

Even though the Rakhee Site Description Report* identified this panchayat as being relatively developed, PVTs were still started here. The primary reason was to increase the production of the irrigated lowlands so that advantage could be taken of the newly installed irrigation system, whereby three crops could be taken instead of the traditional two. The pattern tested here was R-W-M, but if the irrigation system had delivered as expected, R-R-W was to be tried. However, the PVTs here basically failed because of several reasons: 1) the trained JT's work was suspect; 2) the area is not ideally suited for PVTs since it is agriculturally developed already; 3) K39 seed used for the trials was so impure that more than 7 different varieties were acrimoniously pointed out by a farmer in his trial, and these same K39 seedlings were transplanted ten days too late at the suggestion of the JT; and 5) the irrigation system has still not been completed.

ii) Leknath VP (Table 18)

Even though Leknath-Arghaun is also a relatively developed area, the permanent and trained JT stationed there does commendable work. As a result the PVTs, from an economic perspective especially, are successful. Again, K39 seed was impure, but the Arun maize and wheat crops together with recommended rates of chemical fertilizer, performed exceptionally well. This area, bordering the Kathmandu to Pokhara highway, is strategically located so that a production program based on CS technology would probably be successful. However, sterility problems were noticed in UP262, and K39's results are not convincing enough to recommend it for Leknath's agro-climate conditions.

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* S.C. Regmi, B.R. Gurung & D. Lipinski, "Site Description Report for PVTs, Rakhee VP, Kaski District", CSP Technical Report, July 1982.

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iii) Bhalam VP (Table 19)

Originally a R-W-M PVT was started in Bhalam. This pattern was improperly selected since only 5% of the panchayat was described in the site description report as being irrigated lowland, and thereby capable of supporting a triple cropping pattern. One of the major reasons why PVTs are conducted is to use the results for wider area production programs under similar land-type conditions in the PVT tested panchayat. Obviously only a small area could benefit from a R-W-M PVT. Midway through the PVT, the cropping pattern was changed to R-W to make better use of extrapolation potential under rainfed l lowland conditions. But even after changing the pattern, PVTs for Bhalam are only partially suitable because the area is already well developed; in fact, the Site Description Report* found that 100% of the farmers in Bhalam in 1981 were already using chemical fertilizer for all their crops at about half the rate of CS's recommendations.

However, the area can be said to be ready for a production program primarily because the necessary institutions like the Cooperative, Agricultural Development Bank, DADO, together with a Small Farmers Development Project are available and have a reputation for good work in Bhalam. (See the Bhalam Site Description Report, esp.pp. xiii, xiv, 30-35) On a recent visit to the site, farmers expressed a willingness to participate in a 200 Ropani (20 hectare) Production Program in a R-W pattern. Marketing surplus food would not be a problem since areas north of Bhalam are food deficit and Pokhara is only a couple hours by foot to the south west.

From Table 19, one of the major differences between recommended and local practices is the seed rate for wheat. Farmers, especially

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* Babu Ram Gurung and David Lipinski, "Site Description Report for Pre-Production Verification Trials, Bhalam VP, Kaski District," Cropping Systems Program Technical Report, 1982.

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under rainfed conditions are applying only 64 kg/ha (although the Site Description reports 84 kg/ha), while the recommended rate calls for 120 kg/ha. Because the fertilizer input and "local" variety of wheat (RR21) for recommended and farmer's practices are identical, this PVT would be better termed a "difference in seed rate trial."

One of the recurring problems with the PVTs in Bhalam has been the stationing of a part-time JTA, resulting in poor monitoring of the trials. CSP technical staff have also repeatedly stated that the Bhalam area should conduct a M/FM-potatoes upland PVT because the upland area offers more potential for increasing agricultural production. (See various field trip reports by David Lipinski and P.M. Shrestha.)

iv) Ghachok VP (Tables 20, 21 & 22)

Many supervisory trips to Ghachok have been done by CSP and DADO staff, and each time we have witnessed a very positive impact as a result of PVTs. For Ghachok, CSP's PVT technology has been so well received that a CSP government-type production program is probably unnecessary, since most of the farmers in the area have already accepted the recommended varieties, seed rates and some chemical fertilizer application. Gachok has been one of the few ideally selected panchayats for PVTs: Initial site visits to several panchayats north of Pokhara were conducted by CS's staff to choose one area for extension (through PVTs) of CSP's technology which had been generated at CSP's Pumdi Bhumdi Research Site. Ghachok, an area where only a minimum amount of improved technology had been adopted by the farmers, and being relatively close to Pokhara, was jointly chosen by CSP and Kaski DADO staff. A site description was conducted, and three cropping patterns offering good extrapolation and increased production potential, were selected, based partially on the findings of the Site Description Report.*

* Devi Gurung and David Lipinski, "Site Description Report for PVTs", Ghachok VP Kaski District, CSP Technical Report, September 1982.

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Five farmers each forR-W-M, R-Fallow-M and M/FM-W cropping patterns have participated in the PVTs. The total cropping pattern results for all three patterns and improved varieties show high MBCRs, very favourable gross margins, and combined yields of 10 MT/ha or more. Khomal Yellow, for one tial, yielded more than 7MT/ha (weighed after three days sun dried); K39 rice and Arun maize, more than 4 Mt/ha; and UP262, close to 3 MT/ha.

Several notable achievements by Ghachok PVTs are, 1) selling of PVT produced seed to farmers of neighboring panchayats, 2) insistence by farmers from neighboring panchayats that PVTs be conducted in their areas; 3) very good attendence by farmers and supervisory staff for farmers field days, and 4) a farmers and JT initiated, 2-hectare block, K39 pilot production program was conducted this past year. From almost all perspectives, PVTs in Ghachok have demonstrated their usefulness, and now should be completed after the winter wheat crop. For administrators interested in practicably learning more about how to conduct PVTs, we suggest a visit to Ghachok for discussions with the farmers and JT, or to even arrange for some of the farmers and/or JT to visit project staff, etc.

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## III. Agricultural Extension and Research Project and Other Terai PVTs

PVTs conducted in the Terai do not seem to have the same dramatic extension impact as the more remote areas of the hills have had. It can be said that in pockets of the hills, PVTs alone have been sufficient enough to develop the necessary community interest for farmers to essentially initiate their own production program without or with only little government assistance. In the Terai, however, PVTs are not enthusiastically received. A quick pursual of the fertilizer input for farmers' practices recorded on Tables 23-37, highlights one of the problems with Terai PVTs which may also partly account for their indifferent reception. As can be seen from the tables, many of Terai's PVTs have been established in areas where a significant amount of improved practices has already been adopted. PVTs in the Terai are associated with the problem of targeting trials in areas that have relatively good road systems. Rather than properly locate PVTs in undeveloped (usually far from the road) areas, they are often placed in areas where vehicles can easily reach them (which usually means that the area is already relatively developed agriculturally).

Besides the importance of establishing PVTs in undeveloped Panchayats, they are also used to develop appropriate agro-climatic technologies for different ecologocal areas of Nepal. Throughout the Terai, compared to the hills, more similar and typical cropping systems are generally followed. For the Terai, it can be argued that PVTs are not so much needed as are better monitoring of existing practices and coordination among the three major commodity stations and dozens of government farms and irrigation projects working there. For instance, presently CSP is conducting a 17,000 hectare full scale production program in several Terai districts where existing pre-production verification trials are located, or where pre-production verification trials were simply never conducted, and PVTs are evidently not necessary for these areas any how. As one CSP Production Program Officer commented : "Since the Rice-Wheat-Fallow PVT is the same pattern as in the production blocks, the trials are redundant. We now have over 400 hectares of this pattern, so why do five trials ? One of the objectives

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of these PVTs was to determine the potential for expansion of our production program. However, the information from the trials was not used to determine this. The program area for the coming crop was expanded before the trial's results were known, based on observation and talking with farmers"*.

On top of these problems with Terai PVTs, there has a general absence of supervision. AERP, which has overall responsibility for dozens of PVTs, has been continuously hampered by a lack of permanently posted, trained personnel and transportation facilities. A number of coordination efforts were initiated by CSP to train AERP personnel in CS methodology, but thus far, little has been achieved.

PVTs from the Terai where complete information has been received are as follows:

1. Sarlahi District

i) Manusmara Canal Area (Table 23-24)

One type of environment that can be suitable for Terai PVTs is newly opened canal areas. New patterns, especially those enhancing three crops with two of rice, can be quickly tested, and if found workable, greatly assist the extension of triple cropping patterns. Along the Manusmara Canal, R-R-W, R-M-Mung and R-W-Mung were tested with 20 farmers. All the recommended practices for rice outperformed local practices at MBCR levels between 3.5 and 4.5. The gross margins of Pusa Baisakhi mung were between 1000-2000 Rupees/ha more than the local variety, at similar rates of chemical fertilizer application. UP 262 performed exceptionally well at 80:40:0 NPK kg/ha compared to RR 21 at lower fertilizer rates, yielding close to 4 MT/ha.

2. Chitwan District

i) Birendra Nagar V.P. (Last Column of Table 24)

R-W-Fallow PVT tested here with five farmers, but full data collected only from three farmers. At 60:30:0 NPK kg/ha, improved

* - From Keith Roessler memo on Birendra Nagar V.P., Chitwan, PVTs.

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practices performed well enough to record a MBCR of 4.C. This trial was basically a part of the larger area Chitwan District Wheat Production Program.

3. Rautahat District

i) Jhanj V.P. (Table 25)

R-W-Dhaincha, Rice-Rice-Wheat, R-W-Mung, and R-W-M cropping patterns are being tested involving 20 farmers all using 60:0:0 NPK kg/ha for their rice crop under recommended practices. Sabitri slightly out-yielded Laxmi, Masuli and Janaki, but not enough information on local practices was collected to make justifiable comparisons. Also note that no spring rice or maize were taken this year.

4. Sunsari District

i) Hansporia V.P. (Table 26)

Two cropping patterns, R-W-Mung and R-W-Dhaincha, involving 10 farmers were initiated here with the summer 1982 rice crop. Data collection was thorough, and the results demonstrate a reasonable advantage gained from using recommended over farmers' practices. Note also the difference in compost application for both the Sunsari and Morang Districts PVTs.

5. Morang District

i) Dulari V.P. (Table 26)

Data received from here was complete, resulting in a full presentation of the agronomic and economic results. A major reason why the MBCR is relatively low is the high insecticide costs. Janaki marginally outyielded Sabitri at 60:0:0 NPK kg/ha.

6. Parsa District

i) Lipani Birta V.P. (Table 27)

R-Lentil, R-W and R-Mustard cropping patterns are being tested here. Janaki, under irrigated conditions, yielded over 4.0 MT/ha. Bindeshwari and CH 45 performed relatively similar at 60:0:0 NPK kg/ha.

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For the R-W PVT, local rice outyielded Bindeshwari. This area is very close to the Sukchaina CSP Research site, and data probably could be extrapolated from these rather than expend resources on PVTs.

As a final note on PVTs in the Terai, much of the requested information from various farms was either not forwarded or collected improperly. In one field trip report on the status of AERP - Related PVTs (Sept. 26, 1983), P.M. Shrestha and D. Lipinski wrote:

Because these trials are already targeted, they will be conducted: Resources will be spent, efforts will be made, farmers and JT/As will be expecting something. In order to follow the methodology properly - and thereby get the most mileage from your efforts and resources - the supervisory and field level workers (for PVTs) need to be #1) identified, and #2) trained on how to conduct these trials, why and where.

CSP and the different farms responsible for conducting these trials should decide either to drop the trials or to conduct them properly. If the latter, trainings need to be arranged with CSP technical staff as soon as possible.

IV. Resources Conservation and Utilization Project PVTs.

Site description reports, preliminary work plans, trainings and several field trips were completed this past year for the PVTs of both Gorkha and Myagdi Districts*. However, the response from this work has been different for both districts; Myagdi has shown mixed to positive results, but Gorkha's PVTs have floundered. Initially, PVT methodology was not properly followed in either district, but Myagdi has since corrected the situation while Gorkha has not.

In Gorkha, atypical parcel and farmers wereselected, an excessive number of varieties were being tested within the PVT, site descriptions for most PVT areas have not been conducted and the AADO who has been assigned to supervise the trials knows very little about how to conduct PVTs. Whereas in Myagdi, preliminary site visits (termed "site

* - Because CSP has not yet developed appropriate technologies for higher hill environments of Nepal, PVTs were not started in Mustang District.

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reconnaissance" in CS methodology) were conducted at five Panchayats, with three subsequently chosen since they offered the most potential for improvement. Site descriptions were then completed, and based partly on these findings, cropping patterns, crop varieties, farmers, plots and chemical fertilizer rates were selected. The Myagdi DADO has also capitalized on PVTs by strategically placing informative signboards to demonstrate recommended practices compared with local practices.

The data from both these districts has not arrived at CSP yet, but initial findings for Myagdi are generally positive. During a recent field trip a quick MBCR calculation for Khumal Yellow (Kh. Y.) maize (in M/FM-W) netted 4.0, but we need to combine the maize and fingermillet results to make a more complete assessment of the maize relayed Kodo crops. The Taichung 176 rice crop for the R-W and R-F-M PVTs in Patlekhet V. P. was poor, partly due to an impure seed source. In Pakhapani V.P., farmers stated that Kh. Y. did not adversely affect the fingermillet crop, but in Jhee V.P. farmers were complaining that Kh.Y's. thick canopy and late maturity had mostly ruined their fingermillet (the different reactions may have been due to a thinning of the Kh. Y. in Pakhapani by the JTA). Other comments by farmers regarding Kh. Y. were: 1) the variety takes about 10 to 15 days longer to mature than the local, which causes serious problems for farmers since dogs, jackles and livestock single it out for eating, 2) three cobs per plant are usually produced for Kh. Y., but only 1-2 for local, 3) Kh. Y. outproduces local by 35 to 75%, and 4) if Kh. Y. is eaten as gruel or porridge it is as good or better than local, but it does not pop or fry as well.

For remote areas like Myagdi, special concern has to be given to locally store improved varieties, and to conduct separate component technology studies to determine which varieties and rates of chemical fertilizer and seed application are best suited for different areas. Realistic assessments of input availability, quality and timeliness have to be considered along with compost management, livestock grazing practices, availability of fodder, etc. when developing a cropping

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systems technology for larger scale production programs. The site description report flatly states that "the supply of credit and inputs in (these areas)... are in their primary stages, "and" there (are) no local cooperatives or the Agricultural Development Bank in the site Panchayat (and) the distance to reach the (nearest) Sajha Sanstha is not only far but also is very difficult (to reach) due to steep hills". It is obvious that most of the mid to high hill areas of Nepal are confronted by these persistent problems, and agriculturists must confront them when developing technologies for Myagdi and districts like it.

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* - Krishna Bahadur K.C. and Luk Bahadur Rana Magar, "Site Description Report for PVTs, Patlekhet V. P. and Jhee V.P., Myagdi District", C.S.P. Technical Report, 1983. See pp. 4, 11, and 25.

Preface to the Tables of Agronomic and Economic Results of Nepal's Pre-Production Verification Trials

The National Cropping Systems Program has developed recommended cropping pattern technologies for diverse agro-climatic conditions in Nepal, ranging from, mid-hill upland areas under rainfed conditions to Terai lowlands with irrigation. The predominant cropping patterns tested during the past year were Rice-Wheat-Fallow (for use in the mid-hill lowlands with supplemental irrigation or under rainfed conditions) and Maize-Wheat (for use in the mid-hill uplands under rainfed conditions). Other patterns tested in the mid-hills were Maize-Mustard, Maize-Chickpea-Mung, Maize-Barley, Maize relay Fingermillet-Wheat, Rice-Wheat-Mung, Rice and Maize-Wheat, Rice-Wheat-Maize, Rice-Maize-Fallow; and for the Terai, Rice-Rice-Wheat, Rice-Maize-Mung, Rice-Wheat-Mung, Rice-Wheat-Dhaincha, Rice-Wheat-Maize, Rice-Wheat-Fallow, Rice-Lentil-Fallow and Rice-Mustard-Fallow.

Below, we have selected the two most predominant cropping patterns tested during the past year to statistically compare the differences between CSP's recommended and the farmer's own practices. In parenthesis are the 1982/1983 selected performances of these patterns at some of CSP's Research Sites. Note that for the lowland areas, data is averaged under partial irrigation and rainfed conditions.

As you can see from Tables A and B, the Cropping Systems PVT recommended technologies consistently outperformed local practices. Improved varieties of maize together with modest rates of chemical fertilizer application are the most outstanding among all the results. This is largely due to the excellent performance of maize at Ghachok V.P. in Kaski (see tables 21 and 22).

Compared with the Cropping System's Research Sites, the statistics for the R-W pattern are very similar; in fact, the averaged combined yield for the research sites is 6.62, less than a half MT from PVTs combined results which involved 70 - 90 farmers from all over Nepal. And after averaging

Table A : Rice-Wheat-Fallow National PVT Results

| Geographic Area | | Mid hills | Mid hills | Mid hills & Inner Terai | Lower Mid hills | Mid hills | Inner Terai | Lower Mid hills |
|---|---|---|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | R-W | R-W | R-W | R-W |
| Crop | | Rice | Wheat | Total Cropping Pattern Results | Khandbari Cropping Systems Research Site | Pumdi Bhumdi Cropping Systems Research Site | Ratna Nagar Cropping Systems Research Site | Chauri Jahari Cropping Systems Research Site |
| Land Type | | Lowland | Lowland | Lowland | | | | |
| Irrigation | | Partial | Partial | Partial | Rainfed | Rainfed | Rainfed | Irrigated |
| Variety | R.P. | Improved | Improved | Improved | K-39-RR21 | K-39-RR21 | Janaki-UP262 | Sabitri-RR21 |
| | F.P. | Improved & Locals | Improved & Locals | Improved & Locals | | | | |
| Farmers (Number) | R.P. | 78 | 70 | 70-80 | | | | |
| | F.P. | 88 | 70 | 70-90 | | | | |
| Yield (MT/ha) | R.P. | 4.0 | 3.0 | 7.0 | (5.38) | (6.13) | (6.53) | (8.43) |
| | F.P. | 3.3 | 2.13 | 5.43 | | | | |
| Price of Output (Rs/kg) | R.P. | 3.0 | 3.0 | 3.0 | | | | |
| | F.P. | 3.0 | 3.0 | 3.0 | | | | |
| Gross return (Rs/ha) | R.P. | 12,000 | 9,000 | 21,000 | | | | |
| | F.P. | 9,900 | 6,390 | 16,290 | | | | |
| Fertilizer Input (NPK Kg/ha) | R.P. | 51-4-2 | 60-30-0 | 111-34-2 | (106-30-0) | (120-30-0) | (100-20-0) | (120-60-0) |
| | F.P. | 3-1-0 | 17-9-0 | 20-10-0 | | | | |
| Fert. Cost (Rs/ha) | R.P. | 550 | 700 | 1250 | | | | |
| | F.P. | 25 | 225 | 250 | | | | |
| Gross margin (Rs/ha) | R.P. | 11,450 | 8300 | 19750 | | | | |
| | F.P. | 9,875 | 6165 | 16040 | | | | |
| MBCR | | 4.0 | 5.5 | 4.7 | | | | |

RP = Recommended Practice; FP = Farmer's Practices; MBCR = Marginal Benefit Cost Ratio.

Table B: Maize-Wheat National PVT Results

| | | | | | |
|---|---|---|---|---|---|
| Geographic Area | | Mid-hills | Mid-hills | Mid-hills | mid-hills |
| Cropping Pattern | | Maize-Wheat | M - W | Maize-Wheat total Cropping Pattern Results | M/FM - W Pumdi Bhumdi Cropping Systems Research Site (1981/82) data |
| Crop | | Maize | Wheat | | |
| Land Type | | Upland | Upland | | |
| Irrigation | | Rainfed | Rainfed | | |
| Variety | RP | Improved | Improved | Improved | Khumal Y. RR21 |
| | FP | Locals & Impv. | Locals& Impv. | Locals & Impv. | |
| Farmers | RP | 35 | 30 | 30 - 35 | |
| (Number) | FP | 35 | 30 | 30 - 35 | |
| Yield | RP | 4.2 | 2.6 | 6.8 | (4.76) |
| (MT/ha) | FP | 3 | 1.9 | 4.9 | |
| Price of Output | RP | 3.25 | 3.0 | 3.0 - 3.25 | |
| (Rs/kg) | FP | 3.25 | 3.0 | 3.0-3.25 | |
| Gross Return | RP | 13,650 | 7,800 | 21,450 | |
| (Rs/ha) | FP | 9,750 | 5,700 | 15,450 | |
| Fertilizer Input | RP | 47-17-0 | 53-17-0 | 100-34-0 | (125-0-0) |
| (NPK kg/ha) | | 0 | 0 | 0 | |
| Fert. Cost | RP | 550 | 610 | 1,160 | |
| (Rs/ha) | FP | 0 | 0 | 0 | |
| Gross Margin | RP | 13,100 | 7,190 | 20,290 | |
| (Rs/ha) | FP | 9,750 | 5,700 | 15,450 | |
| MBCR | | 7 | 3.4 | 5.2 | |

RP = Recommended Practices; FP = Farmers' Practices; MBCR = Marginal Benifit Cost Ratio

CS's chemical fertilizer application, the results are even more similar with an average 111-34-2 NPK kg/ha for the PVTs, and 111-35-0 for CS's research sites, This is a faily solid indicator that CS's recommended technology (for R-W at least) is appropriate, ready and useable for diverse agro-climatic areas of Nepal having similar conditions as CSP's research sites.

As a final point, noting that 1) the results of CS's research are meant to be extrapolated over wider areas to benefit more farmers and families of Nepal, and 2) a considerable amount of research and production program work has already been done in the Terai and lower mid-hills, which are relatively developed compared to the higher mid-hills and high hills of Nepal where a large percentage of the population lives, and where most of the food deficit areas are, we strongly suggest that CSP divert more resources tp developing improved technologies for the higher hills of Nepal. The initial impact of improving farming systems in these more remote areas would most likely be more dramatic and beneficial then would continuing large efforts for Terai and lower hills agriculture. This is primarily because so little work has been done in the high hills, whereas years of research, all the major commodity stations, production campaign work, etc. have been developed for the Terai and the lower hills of Nepal. CSP has recorded major success for these areas of Nepal, and the time is now ripe to move CS expertise into areas that most need it -- the mid to high hills of Nepal.

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District: DANG V.P. AMRITPUR

Table No. 1 Year: 1982-83

| Season | | Winter | Summer 83 | Summer 83 | Total cropping pattern | Total cropping pattern |
|---|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | R-W | R-W |
| Land Type | | Lowland | Lowland | Lowland | | |
| Fertility Level | | Medium-High | Med-High | Med-High | | |
| Irrigation | | 2-3x | Continuous | Continuous | | |
| Crop | | Wheat | Rice | Rice | | |
| Variety | R.P | UP-262 | Kanchan | K-39 | UP 262-Kan | UP262-K39 |
| | F.P | RR-21, NL-30 | Locals | Locals | Local | Local |
| Yield | R.P. | 2.56 | 3.46 | 4.55 | 6.0 | 7.1 |
| (MT/ha) | F.P. | 1.29 | 2.32 | 2.32 | 3.6 | 3.6 |
| Price of Output | R.P | 2/65 | 2/59 | 2/57 | | |
| (Rs./kg) | F.P | 2/65 | 2/57 | 2/57 | | |
| Gross Returns | R.P | 6492.5 | 8892/30 | 11693/50 | 15,385 | 18,186 |
| (Rs./ha) | F.P | 3418.5 | 5962/40 | 5962/40 | 9,381 | 9,381 |
| Fertilizer Input | R.P. | 80:40:0 | 60:0:0 | 60:0:0 | 140:40:0 | 140:40:0 |
| (NPK kg/ha) | F.P | 15:14:0 | 0:0:0 | 0 0:0 | 15:14:0 | 15:40:0 |
| Fertilizer Cost | R.P | 954.32 | 458/00 | 458/00 | 1412 | 1412 |
| (Rs/ha) | F.P | 235.10 | 0 | 0 | 235 | 235 |
| Compst | R.P | 0 | 0 | 0 | | |
| (MT/ha) | F.P | 0 | 0 | 0 | | |
| Insecticide | R.P. | 0 | 96 | 120 | 96 | 120 |
| Cost (Rs-ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P. | 5541.18 | 8338/20 | 11,115/00 | 13,879 | 16,656 |
| (Rs/ha) | F.P. | 3183.4 | 5962/40 | 5,962/00 | 9,145 | 9,145 |
| Marginal Benifit Cost Ratio | | 4.3 | 4.2 | 8.9 | 4.5 | 7.0 |
| Farmers | R.P | 5 | 4 | 1 | | |
| (Number) | F.P | 5 | 5 | 5 | | |

Note: R.P. = The recommended practices which were tested;
F.P. = The farmer's practices.

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District: DANG V.P. AMRITPUR

Table No: 2 Year: 81-82

| Season | | Summer | Winter | Total Cropping Pattern | Summer 83 |
|---|---|---|---|---|---|
| Cropping Pattern | | M - Mu | M - Mu | Maize-Mustard | Maize-Chick+Mu-Pea |
| Land Type | | Upland | Upland | | Upland |
| Fertility Level | | Med. | Med | | Med |
| Irrigation | | Rainfed | Rainfed | | Rainfed |
| Crop | | Maize | Mustard | | Maize |
| Variety | R.P | Rampur Com. | Local | Rampur C.-Local | Rampur Com. |
| | F.P. | Local Improved | Local | Local-Local | Local Improved |
| Yield | R.P | 2.49 | 1.01 | 3.5 | 3.76 |
| (MT/ha) | F.P | 1.63 | 0.65 | 2.3 | 2.58 |
| Price of output | R.P | 1.20 | 5.7 | | 2.0 |
| (Rs/Kg) | F.P | 1.20 | 5.7 | | 2. |
| Gross Returns | R.P | 2988.0 | 5757 | 8745 | 7520 |
| (Rs./ha) | F.P | 1956.0 | 3705 | 5661 | 5160 |
| Fertilizer Input | R.P | 60:30:0 | 20:20:0 | 80:50:0 | 80:40:30 |
| (NPK Kg/ha) | F.P | 0:0:0 | 3:3:3 | 3:3:3 | 0:0:0 |
| Fertilizer Cost | R.P | 637 | 325.00 | 962 | 1033 |
| (Rs/ha) | F.P | 0 | 49 | 49 | 0 |
| Compost | R.P | 4.0 | 0 | | 6.4 |
| (MT/ha) | F.P | 4.0 | 0 | | 4.4 |
| Insecticide | R.P | 54 | 0 | 54 | 81 |
| (Cost (Rs./ha) | F.P | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 2297.0 | 5432 | 7729 | 6390 |
| (Rs./ha) | F.P | 1956.0 | 3656. | 5612 | 5160 |
| Marginal Benefit Cost Ratio | | .5 | 4.75 | 3 | 1.1 |
| Farmers | R.P | 5 | 5 | | 5 |
| (Number) | F.P | 5 | 5 | | 5 |

Note: R.P. = The recommended practices which were tested;
F.P. = The farmer's practices.
* MU = Mustard.

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District: DANG V.P.: CHILAHI

Table No: 3 Year : 82-83

| Season | | Winter | Summer 83 | Summer 83 |
|---|---|---|---|---|
| Cropping Patter | | R-W | R-W | Maize-Mu-Chickpea |
| Land Type | | Lowland | Lowland | Upland |
| Fertility Level | | Med-High | Med-High | Med |
| Irrigation | | 2 x | Continuous | Rainfed |
| Crop | | Wheat | Rice | Maize |
| Variety | R.P | UP-262 | Chandina | Ram, Yellow |
| | F.P | N.C. | Locals+Loc.Imp | Ram. Com. |
| Yield | R.P | 1.71 | 3.98 | 3.87 |
| (MT/ha) | F.P | N.C. | 2.58 | 2.88 |
| Price of Output | R.P | 2.50 | 3 | 2 |
| (Rs./kg | F.P | 2.50 | 3 | 2 |
| Gross Returns | R.P | 4275 | 11940 | 7740 |
| (Rs./ha) | F.P | N.C. | 7740 | 5760 |
| Fertilizer Input | R.P | 80:40:0 | 60:30:30 | 80:40:30 |
| (NPK Kg/ha) | F.P | N.C. | 0 | 0:0:0 |
| Fertilizer Cost | R.P | 954 | 798 | 1032 |
| (Rs/ha) | F.P | N.C. | 0 | 0 |
| Compost | R.P | 0 | 0 | N.C. |
| (MT/ha) | F.P | 0 | 0 | N.C. |
| Insecticide | R.P | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 |
| Gross Margin | R.P | 3321 | 11142 | 6707 |
| (Rs/ha) | F.P | N.C. | 7740 | 5760 |
| Marginal Benifit Cost Ratio | | N.A. | 4.3 | 1.9 |
| Farmers | R.P | 5 | 5 | 4 |
| (Number) | F.P | N.C. | 5 | 4 |

Note: R.P. = The recommended practices which were tested,
F.P. = The farmer's practices,
N.C. = Not collected,
N.A. = Not applicable.

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District: DANG V.P.: LAXMIPUR

Table No.: 4 Year: 82-83

| Season | | Winter | Summer (83) | Total cropping Pattern | Summer 83 |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | Maize-Chick-pea + MU* |
| Land Type | | Lowland | Lowland | | Upland |
| Fertility Level | | Med.-Low | Med - Low | | Med. |
| Irrigation | | 3 x | Continuous | | Rainfed |
| Crop | | Wheat | Rice | | Maize |
| Variety | R.P | UP - 262 | Chandina | UP262-Chandina | Ram. Com |
| | F.P | RR-21, NL-30 | Local (Tilki) +Sabitri | RR 21- Local | Local seto+ Local Impd. |
| Yield | R.P | 3.41 | 4.25 | 7.66 | 5.96 |
| (MT/ha) | F.P | 2.68 | 2.89 | 5.57 | 3.54 |
| Price of Output | R.P | 2.50 | 1/75 | | 2/00 |
| (Rs/kg) | F.P | 2.50 | 2/00 | | 2/15 |
| Gross Returns | R.P | 8525 | 7437 | 15962 | 11920 |
| (Rs/ha) | F.P | 6700 | 5780 | 12480 | 7611 |
| Fertilizer Input | R.P | 80:40:0 | 60:0:0 | 140:40:0 | 80:40:30 |
| (NPK Kg/ha | F.P | 63:29:0 | 26:20:0 | 89:49:0 | 0:0:0 |
| Fertilizer Cost | R.P | 954 | 458 | 1412 | 1033 |
| (Rs/ha) | F.P | 403 | 371 | 774 | 0 |
| Compost | R.P | 0 | 0 | | 7 |
| (MT/ha) | F.P | 0 | 0 | | 6 |
| Insecticide | R.P | 0 | 0 | | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | | 0 |
| Gross Margin | R.P | 7570 | 6979 | 14549 | 10887 |
| ( Rs/ha) | F.P | 6295 | 5410 | 11705 | 7611 |
| Marginal Benifit Cost Ratio | | 3.30 | 17 | 5.5 | 3.2 |
| Farmers | R.P | 4 | 5 | | 5 |
| (Number) | F.P | 4 | 5 | | 5 |

Note: R.P. = The recommended practices which were tested;
F.P. = The farmer's practices.
Mu = Mustard

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District: SALYAN V.P.: DADA GAUN

Table No.: 5 Year: 82-83.

| Season | | Summer 82 | Summer 82 | Winter 82-83 | Summer 83 | Total cropping pattern |
|---|---|---|---|---|---|---|
| Cropping Pattern | | M-W | M-W | R-W | R-W | R-W |
| Land Type | | Upland | Upland | Lowland | Lowland | |
| Fertility Level | | Med | Med | Med | Med | |
| Irrigation | | Rainfed | Rainfed | 4 x | Continuous | |
| Crop | | Maize | Maize | Wheat | Rice | |
| Variety | R.P | Khumal | Local seto | UP262 | Kanchan | UP262-Kan. |
| | F.P. | Local seto | Local seto | Locals | Tharuwa | Loc.Tharuwa |
| Yield | R.P | 2.8 | 3.08 | 3.75 | 4.46 | 8.21 |
| (MT/ha | F.P | 2.37 | 2.37 | 2.07 | 3.07 | 5.14 |
| Price of Output | R.P | 2.0 | 2.0 | 3/00 | 3/00 | |
| (R./kg) | F.P | 2.0 | 2.0 | 3/00 | 3/00 | |
| Gross Returns | R.P | 5600 | 6160 | 11250 | 13380 | 24630 |
| (Rs./ha) | F.P | 4740 | 4740 | 6210 | 9210 | 15420 |
| Fertilizer Input | R.P | 60:30:0 | 60:30:0 | 60:30:0 | 60:00:0 | 120:30:0 |
| (NPK/kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 7.2:0:0 | 7.2:0:0 |
| Fertilizer Cost | R.P | 715 | 715 | 715 | 456 | 1171 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 55 | 55 |
| Compost | R.P | N.C. | N.C. | 0 | 3 | 3 |
| (MT/ha) | F.P | N.C. | N.C. | 6 | 4 | 10 |
| Insecticide | R.P | 0 | 0 | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 4884 | 5444 | 10,534 | 12,924 | 23,458 |
| (Rs./ha) | F.P | 4740 | 4740 | 6,210 | 9,155 | 15,365 |
| Marginal Benifit Cost Ratio | | 0.2 | 1 | 7.04 | 9.38 | 8 |
| No. of Farmers | R.P | 5 | 5 | 5 | 5 | |
| | F.P | 5 | 5 | 5 | 5 | |

Note: R.P. = The recommended practices which were tested;
F.P. = The farmer's practices.

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District; SALYAN V.P.: CHIYACHETRA

Table: 6A Year: 82/83

| Season | | Summer 82 | Summer 82 | Winter 82-83 | Summer 83 |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | R-W |
| Land Type | | Lowland | Lowland | Lowland | Lowland |
| Fertility Level | | Med-High | Med-High | Med-High | Med-High |
| Irrigation | | Continuous | Continuous | 3 x | Continuous |
| Crop | | Rice | Rice | Wheat | Rice |
| Variety | R.P | K-39* | CH-242 | UP-262 | Himali |
| | F.P | Local | Local | Local+AR-21 | Local Imp.(Tharuwa) |
| Yield | R.P | 3.12 | 3.08 | 3.58 | 2.60 |
| (MT/ha) | F.P | 2.40 | 2.40 | 2.16 | 2.05 |
| Price of Output | R.P | 4.0 | 4.0 | 3.0 | 3 |
| (Rs./kg) | F.P | 4.0 | 4.0 | 3.0 | 3 |
| Gross Returns | R.P | 12480 | 12320 | 10740 | 7,800 |
| (Rs/ha) | F.P | 9600 | 9600 | 6480 | 6,150 |
| Fertilizer Input | R.P | 80:0:0 | 80:0:0 | 60:30:0 | 60:0:0 |
| (NPK Kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 4.6:0:0 |
| Fertilizer Cost | R.P | 607 | 607 | 715 | 456 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 35 |
| Compost | R.P | 0 | 0 | 0 | 0 |
| (MT/ha) | F.P | 9.0 | 9.0 | 4.0 | 3.0 |
| Insecticide | R.P. | 0 | 0 | 0 | 0 |
| (Cost (Rs/ha) | F.P. | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 11872 | 11713 | 10024 | 7334 |
| (Rs/ha) | F.P | 9600 | 9600 | 6480 | 6115 |
| Marginal Benifit Cost Ratio | | 4.7 | 4.5 | 6 | 3.9 |
| Farmers | R.P | 3 | 5 | 5 | 5 |
| (Numbers) | F.P | 5 | 5 | 5 | 5 |

Note: R.P. = The recommended practices which were tested,

F.P. = The farmer's practices.

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District: SALYAN V.P.: CHHIYA CHETRA

Table No. 6B Year: 83

| Season | | Total Cropping Pattern | Total Cropping Pattern | Total Cropping Pattern |
|---|---|---|---|---|
| Cropping Pattern | | W-R | R-W | R-W |
| Land Type | | | | |
| Fertility Level | | | | |
| Irrigation | | | | |
| Crop | | | | |
| Variety | R.P | UP262-Himali | CH242-UP262 | K39-UP262 |
| | F.P | Local - Local | Local - Local | Local - Local |
| Yield | R.P | 6.18 | 6.66 | 6.7 |
| (MT/ha) | F.P | 4.21 | 4.56 | 4.56 |
| Price of Output | R.P | | | |
| (Rs/kg) | F.P | | | |
| Gross Returns | R.P | 18540 | 23060 | 23220 |
| (Rs/ha) | F.P | 12630 | 16080 | 16080 |
| Fertilizer Input | R.P | 120:30:0 | 140:30:0 | 140:30:0 |
| (NPK Kg/ha) | F.P | 4.6:0:0 | 0 | 0:0:0 |
| Fertilizer Cost | R.P | 1171 | 1322 | 1322 |
| (Rs/ha) | F.P | 35 | 0 | 0 |
| Compost | R.P | 0 | 0 | 0 |
| (MT/ha) | F.P | 7 | 13 | 13 |
| Insecticides | R.P | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 |
| Gross Margin | R.P | 17368 | 21737 | 21896 |
| (Rs/ha) | F.P | 12595 | 16080 | 16080 |
| Marginal Benifit Cost Ratio | | 5.2 | 5.3 | 5.4 |
| Farmers | R.P | | | |
| (Number) | F.P | | | |

Note: R.P. = The recommended practices which were tested.

F.P. = The farmer's practices.

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District: SALYAN V.P.: CHIYA CHETRA

Table No.: 7 Year: 82-83

| Season | | Summer | Winter | Winter | Total Cropping pattern | Total Croppint pattern |
|---|---|---|---|---|---|---|
| Cropping Pattern | | M-W | M-W | M-W | M-W | M-W |
| Land Type | Up | Upland | Upland | Upland | | |
| Fertility Level | | Med | Med | Med | | |
| Irrigation | | None | None | None | | |
| Crop | | Maize | Wheat | Wheat | | |
| Variety | R.P | Khumal Yel | UP-262 | RR-21 | Khum Yel. UP 262 | Khum Yel. RR 21 |
| | F.P | Local Seto | Local | Local | Loc.seto Lo | Loc.-Loc. |
| Yield | R.P | 2.68 | 3.40 | 3.20 | 6.08 | 5.88 |
| (MT/ha) | F.P | 2.20 | 2.28 | 2.28 | 4.48 | 4.48 |
| Price of Output | R.P | 2.0 | 3.0 | 3.0 | | |
| (Rs/kg) | F.P | 2.0 | 3.0 | 3.0 | | |
| Gross Returns | R.P | 5360 | 10200 | 9600 | 15560 | 14960 |
| (Rs/ha) | F.P | 4400 | 6720 | 6720 | 11120 | 11120 |
| Fertilizer Input | R.P | 60:30:0 | 60:30:0 | 60:30:0 | 120:60:0 | 120:60:0 |
| (NPK Kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0 | 0 |
| Fertilizer Cost | R.P | 715 | 715 | 715 | 1430 | 1430 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Compost | R.P | 12 | 0 | 0 | 12 | 12 |
| (MT/ha) | F.P | 24 | 8 | 8 | 32 | 32 |
| Insecticide | R.P | 0 | 0 | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Cross Margin | R.P | 4644 | 9484 | 8884 | 14128 | 13528 |
| (Rs/ha) | F.P | 4400 | 6720 | 6720 | 11120 | 11120 |
| Marginal Benifit Cost Ratio | | 4 | 4.9 | 4 | 3 | 2.7 |
| Farmers | R.P | 5 | 5 | 5 | | |
| (Number) | F.P | 5 | 5 | 5 | | |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

District: PYUTHAN V.P.: BIJAYNAGAR/DAKAQUADI

Table: 8 Year: 82-83

| Season | | Winter | Summer | Winter | Total Cropping Pattern |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | M-B | M-B | M-B |
| Land Type | Low | Lowland | Upland | Upland | |
| Fertility Level | | Med-High | Med-High | Med-High | |
| Irrigation | | 3x | Rainfed | Supplemental | |
| Crop | | Wheat | Maize | Barley | |
| Variety | R.P | UP-262 | Khumal Yel | Bonus | Khumal-Bonus |
| | F.P | NL-30 | R.Compo.Loc | Local | Local-Local |
| Yield | R.P | 3.9* | 3.25 | 2.18 | 5.43 |
| (MT/ha) | F.P | 1.8* | 3.50* | 2.5* | 6.0 |
| Price of Output | R.P | 3.50 | 3.83 | 3.60 | |
| (Rs/kg) | F.P | 3.50 | 3.83 | 3.60 | |
| Gross Returns | R.P | 13650 | 12447 | 7848 | 20295 |
| (Rs/ha) | F.P | 6300 | 13405 | 9000 | 22405 |
| Fertilizer Input | R.P | 80:40:0 | 45:0:0 | 20:20:0 | 65:20:0 |
| (NPK Kg/ha) | F.P | 20:10:0 | 0:0:0 | 0:0:0 | 0 |
| Fertilizer Cost | R.P | 954 | 317 | 325 | 642 |
| (Rs/ha) | F.P | 220 | 0 | 0 | 0 |
| Compost | R.P | 0 | 8 MT | N.C. | |
| (MT/ha) | F.P | 0 | 8 MT | N.C. | |
| Insecticide | R.P | 0 | 0 | 0 | 0 |
| Cost (Rs./ha) | F.P | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 12695 | 12130 | 7523 | 19653 |
| (Rs/ha) | F.P | 6300 | 13405 | 9000 | 22405 |
| Marginal Benifit Cost Ratio | | 10 | Negative | Negative | Negative |
| Farmers | R.P | 5 | 5 | 5 | |
| (Number) | F.P | 5 | 5 | 5 | |

Note: R.P. = The recommended practices which were tested,

F.P. = The farmer's practices.

* from farmer's estimates of yields.

N.C. = Not Collected

District: PYUTHAN V.P.: BIJUWAR

Table No.: 9 Year: 82-83

| Season | | Summer 82 | Summer 82 | Summer 82 | Winter | Total Cropping Pattern |
|---|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | M-B | M-B | |
| Land Type | | Lowland | Lowland | Upland | Upland | |
| Fertility Level | | High-Med | High-Med | Med-High | Med-High | |
| Irrigation | | Continuous | Cont. | Rainfed | Supplemental | |
| Crop | | Rice | Rice | Maize | Barley | |
| Variety | R.P | Sabitri | Janaki | Khumal Yel | Bonus | Khu. Y.-Bonus |
| | F.P. | Marci | Marci | Sarlhi seto | Local | Sarl.seto loc. |
| Yield | R.P | 4.28 | 6.0 | 2.5 | 1.8 | 4.3 |
| (MT/ha | F.P | 2.8 | 3.0 | 3.0 | 2.2 | 5.2 |
| Price of Output | R.P | 2.5 | 2.5 | 3.83 | 3.60 | |
| (Rs/kg) | F.P | 2.5 | 2.5 | 3.83 | 3.60 | |
| Gross Returns | R.P | 10700 | 15000 | 9575 | 6480 | 16055 |
| (Rs/ha) | F.P | 7000 | 7500 | 11490 | 7920 | 19410 |
| Fertilizer Input | R.P | 60:0:0 | 60:0:0 | 45:0:0 | 20:20:0 | 65:20:0 |
| (NPK Kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0:0:0 | |
| Fertilizer Cost | R.P | 455 | 455 | 317 | 325 | 642 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Compost | R.P | 0 | 0 | 8-12 | 8 | 18 |
| (MT/ha) | F.P | 0 | 0 | 8-12 | 8 | 18 |
| Insecticide | R.P | 0 | 0 | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 10244 | 14544 | 9257 | 6155 | 15412 |
| (Rs/ha) | F.P | 7000 | 7500 | 11490 | 7920 | 19410 |
| Marginal Benifit Cost Ratio | | 8 | 16.4 | Negative | Negative | Negative |
| Farmers | R.P | 3 | 2 | 5 | 5 | |
| (Number) | F.P | 3 | 2 | 5 | 5 | |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

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Table No: 10

District: ROLPA V.P.: LIBANG

Year: 82-83

| Season | | Winter | Winter | Summer 83 | Summer 83 |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | R-W |
| Land Type | | Lowland | Lowland | Lowland | Lowland |
| Fertility Level | | Med-High | Med-High | Med-High | Med-High |
| Irrigation | | 3 x | 3 x | Continuous | Continuous |
| Crop | | Wheat | Wheat | Rice | Rice |
| Variety | R.P | UP-262 | UP-262 | Himali | Kanchan |
| | F.P | Local | Local | Local marsi | Local marsi |
| Yield | R.P | 1.73 | 1.40 | 3.88 | 5.88 |
| (MT/ha) | F.P | 1.54 | 1.54 | 4.91 | 4.91 |
| Price of Output | R.P | 4.0 | 4.0 | 4.50 | 4.50 |
| (Rs/kg) | F.P | 4.0 | 4.0 | 4.00 | 4.00 |
| Gross Returns | R.P | 6920 | 5600 | 17460 | 26460 |
| (Rs/ha) | F.P | 6160 | 6160 | 19640 | 19640 |
| Fertilizer Input | R.P | 60:30:0 | 40:20:0 | 46:0:0 | 46:0:0 |
| (NPK kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0:0:0 |
| Fertilizer Cost | R.P | 715 | 476 | 350 | 350 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 |
| Compost | R.P | 5.0 | 5.0 | 0 | 0 |
| (MT/ha) | F.P | 5.0 | 5.0 | 0 | 0 |
| Insecticide | R.P | 0 | 0 | 8.6 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 6204 | 5123 | 17101.4 | 26110 |
| (Rs/ha) | F.P | 6160 | 6160 | 19640 | 19640 |
| Marginal Benifit cost Ratio | | 1 | Negative | Negative | 18.5 |
| Farmers | F.P | 5 | 5 | 5 | 2 |
| (Number) | L.P | 5 | 5 | 7 | 7 |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

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District: ROLPA V.P.: LIBANG

Table No.: 11 Year: 82-83

| Season | | Summer 82 | Winter 82 | Winter 83 | Total Cropping Pattern | |
|---|---|---|---|---|---|---|
| Cropping Patter | | M-W | M-W | M-W | M-W | |
| Land Type | | Upland | Upland | Upland | | |
| Fertility Level | | Med. | Med. | Med | | |
| Irrigation | | Rainfed | Sup. | Sup. | | |
| Crop | | Maize | Wheat | Wheat | | |
| Variety | R.P | Khumal | UP-262 | RR-21 | Khumal Y UP 262 | Khumal Yel RR 21 |
| | F.P | Local | Local | Local | Local-Local | Local-Local |
| Yield | R.P | 5.1 | 1.58 | 2.856 | 6.7 | 8 |
| (MT/ha) | F.P | 3.9 | 2.01 | 2.01 | 5.9 | 5.9 |
| Price of Output | R.P | 3.83 | 4.0 | 4.0 | | |
| (Rs/kg) | F.P | 3.83 | 4.0 | 4.0 | | |
| Gross Returns | R.P | 19533 | 6320 | 11424 | 25853 | 30957 |
| (Rs/ha) | F.P | 14937 | 8040 | 8040 | 22977 | 22977 |
| Fertilizer Input | R.P | 30:0:0 | 40:20:0 | 40:20:0 | 70:20:0 | 70:20:0 |
| (NPK) kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0 | 0 |
| Fertilizer Cost | R.P | 202 | 477 | 477 | 679 | 679 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Compost | R.P | 8 | N.C. | N.C. | | |
| (MT/ha) | F.P | 8 | N.C. | N.C. | | |
| Insecticide | R.P | 0 | 0 | 0 | 0 | 0 |
| Cost (Rs./ha) | F.P | | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 19331 | 5844 | 10947 | 25175 | 30278 |
| (Rs/ha) | F.P | 14937 | 8040 | 8040 | 22977 | 22977 |
| Marginal Benifit Cost Ratio | | 22.7 | Neg. | 6 | 4.2 | 11.8 |
| Farmers | R.P | 8 | 5 | 5 | | |
| (Number) | F.P | 8 | 5 | 5 | | |

Note: R.P. = The recommended practices which were tested.

F.P. = The farmer's practices.

N.C. = Not collected

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District: ROLPA V.P.: JANKOT

Table No.: 12A Year: 82-83

| Season | | Summer | Summer | Winter | |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | R-W | |
| Land Type | | Lowland | Lowland | Lowland | |
| Fertility Level | | Med | Med | Med | |
| Irrigation | | Continuous | Continuous | Continuous | |
| Crop | | Rice | Rice | Wheat | |
| Variety | R.P | CH-242 | K-39 | UP-262 | |
| | F.P | Local | Local | Local | |
| Yield | R.P | 4.86 | 3.72 | 3.83 | 3.18 |
| (MT/ha) | F.P | 3.33 | 3.33 | 2.07 | 2.07 |
| Price of Output | R.P | 4.0 | 4.0 | 4.0 | 4.0 |
| (Rs/kg) | F.P | 4.0 | 4.0 | 4.0 | 4.0 |
| Gross Returns | R.P | 19440 | 14880 | 15320 | 12720 |
| (Rs/ha) | F.P | 13320 | 13320 | 8280 | 8280 |
| Fertilizer Input | R.P | 45:0:0 | 45:0:0 | 60:30:0 | 40:20:0 |
| (NPK Kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0:0:0 |
| Fertilizer Cost | R.P | 304 | 304 | 715 | 477 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 |
| Compost | R.P | 0 | 0 | 3.0 | 3.0 |
| (MT/ha) | F.P | 0 | 0 | 3.0 | 3.0 |
| Insecticide | R.P | 0 | 0 | 0 | 0 |
| Cost (Rs./ha) | F.P. | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 19136 | 14576 | 14605 | 12243 |
| (Rs/ha) | F.P | 13320 | 13320 | 8280 | 8280 |
| Marginal Benifit Cost Ratio | | 20.1 | 5.1 | 8.84 | 8.310 |
| Fermers | R.P | 5 | 5 | 4 | 4 |
| (Number) | F.P | 5 | 5 | 4 | 4 |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

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District: ROLPA V.P. : JANKOT

Table No.: 12B Year: 82-83

| Season | | Total Cropping Pattern | | Total Cropping Pattern | |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | W-R | W-R |
| Land Type | | | | | |
| Irrigation | | | | | |
| Variety | R.P | CH242-UP262 | K39-UP262 | UP262-Himali | UP262-Kanchan |
| | F.P | Local | Local | Local-Taichung | Local-Taichung |
| Yield | R.P | 8.69 | 7.55 | 5.9 | 8.25 |
| (T/ha) | F.P | 5.4 | 5.4 | 4.8 | 4.8 |
| Gross Return | R.P | 34760 | 30200 | 30000 | 35445 |
| (Rs/ha) | F.P | 21600 | 21600 | 19080 | 19080 |
| Fertilizer Input | R.P | 105:30:0 | 105:30:0 | 86:20:0 | 86:20:0 |
| (NPK Kg/ha) | F.P | 0 | 0 | 0 | 0 |
| Fertilizer Cost | R.P | 1019 | 1019 | 827 | 827 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 |
| Compost | R.P | 3 | 3 | 3 | 3 |
| (Ton/ha) | F.P | 3 | 3 | 3 | 3 |
| Insecticide Cost | R.P | 0 | 0 | 0 | 0 |
| (Rs./ha) | F.P | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 33741 | 29181 | 29173 | 34618 |
| (Rs/ha) | F.P | 21600 | 21600 | 19080 | 19080 |
| Marginal Benifit Cost Ratio | | 13 | 8 | 13 | 20 |

Note: R.P. = The recommended practices which were tested;
F.P. = The farmer's practices.

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District: ROLPA V.P.: JANKOT

Table No.: 13 Year: 83

| Season | | Summer (83) | Summer (83) | Summer |
|---|---|---|---|---|
| Cropping Pattern | | R-W | R-W | M-W |
| Land Type | | Lowland | Lowland | Upland |
| Fertility Level | | Med-High | Med-High | Med-High |
| Irrigation | | Continuous | Continuous | Supplemental |
| Crop | | Rice | Rice | Maize |
| Variety | R.P | Himali | Kanchan | Khumal |
| | F.P | Thaichung | Thaichung | Local |
| Yield | R.P | 3.84 | 5.05 | 3.86 |
| (MT/ha) | F.P | 2.70 | 2.70 | 2.92 |
| Price of Output | R.P | 4/50 | 4/50 | 3.83 |
| (Rs/kg) | F.P | 4/00 | 4/00 | 3.83 |
| Gross Returns | R.P | 17280 | 22725 | 14784 |
| (Rs/ha) | F.P | 10800 | 10800 | 11184 |
| Fertilizer Input | R.P | 46:0:0 | 46:0:0 | 30:0:0 |
| (NPK kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 |
| Fertilizer Cost | R.P | 350 | 350 | 202 |
| (Rs/ha) | F.P | 0 | 0 | 0 |
| Compost | R.P | 0 | 0 | 8 |
| (MT/ha) | F.P | 0 | 0 | 8 |
| Insecticide | R.P | 0 | 0 | 0 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 |
| Gross Margin | R.P | 16930 | 22375 | 14583 |
| (Rs/ha) | F.P | 10800 | 10800 | 11184 |
| Marginal Benifit Cost Ratio | | 17.5 | 33.1 | 17.8 |
| Farmers | R.P | 5 | 2 | 7 |
| (Number) | F.P | 7 | 7 | 7 |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

District: RUKUM V.P.: CHIBANG

Table No.: 14 Year: 82-83

| Season | | Winter | Spring | Summer 83 | Total Cropping Pattern |
|---|---|---|---|---|---|
| Cropping Pattern | | R-W-Mu | R-W-Mu | R-W-Mung | R-W-Mung |
| Land Type | | Lowland | Lowland | Lowland | |
| Fertility Level | | High-Med | Med-High | Med-High | |
| Irrigation | | 4 x | 2 x | Continuous | |
| Crop | | Wheat | Mung | Rice | |
| Variety | R.P | UP-262 | Pusa Bisaki | Janaki | UP262-Mung-R |
| | F.P | Local Impvd. | N.A. | Local | Locals |
| Yield | R.P | 4.31 | 0.430 | 5.2 | 9.51 |
| (MT/ha) | F.P | 2.2* | 0 | 3.02 | 5.22 |
| Price of Output | R.P | 3.5 | 11/oo | 3/50 | |
| (Rs./kg) | F.P | 3.5 | N.A. | 3/50 | |
| Gross Returns | R.P | 15085 | 4730 | 18200 | 33285** |
| (Rs/ha) | F.P | 7700 | 0 | 10570 | 18270 |
| Fertilizer Input | R.P | 80:40:0 | 0:0:0 | 46:0:0 | 126:40:0 |
| (NPK kg/ha) | F.P | 0:0:0 | N.A. | 6:3:0 | 6:3:0 |
| Fertilizer Cost | R.P | 954 | 0 | 350 | 1304 |
| (Rs/ha) | F.P | 0 | N.A | 72 | 72 |
| Compost | R.P | 6 | 0 | 4.5 | 10.5 |
| (MT/ha) | F.P | 6 | N.A | 60 | 12 |
| Insecticide | R.P | 0 | 0 | 72 | 72 |
| Cost (Rs/ha) | F.P | 0 | N.A. | 72 | 72 |
| Gross Margin | R.P | 14131 | N.A. | 17778 | 31909 |
| (Rs/ha) | F.P | 7700 | N.A | 10426 | 18126 |
| Marginal Benifit Cost Ratio | | 7 | N.A | 26 | 12** |
| Farmers | R.P | 12 | 10 | 10 | |
| (Number) | F.P | N.A. | N.A. | 10 | |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

* Data from 81-82 crop cuttings.

* Mung was introduced as a new crop to this area. Thus there is no local treatment (F.P.)

** Note that if the gross returns for mung (4730 Rs.) were included the MBCR = 16 (without labor and seed costs included in the total variable costs).

Table No.: 15

Distrct: RUKUM V.P.: CHIBANG

Year: 81-82

| Season | | Winter | Summer | Summer | Winter | Summer |
|---|---|---|---|---|---|---|
| Cropping Pattern | | W-R+M | W-R+M | W-R+M | R-W-Mung | R-W-Mung |
| Land Type | | Upland | Upland | Upland | Lowland | Lowland |
| Fertility Level | | High-Med | High-Med | High-Med | High-Med | High-Med |
| Irrigation | | * Supp. | Rainfed | Rainfed | 3 x | Continuous |
| Crop | | Wheat | Rice | Maize | Wheat | Rice |
| Variety | R.P | NL30 + HD-1982 | IET-1444 | Arun | NL-30 | Janaki |
| | F.P | Local Imp | Local | Local | Local | Local Imp. |
| Yield | R.P | 4.8 | 2.80 | 1.5 | 3.1 | 3.1 |
| (MT/ha) | F.P | 4.1 | N.C. | N.C. | 2.2 | N.C. |
| Price of Output | R.P | 3.25 | 2.35 | 3.75 | 3.25 | 3.25 |
| (Rs./kg) | F.P | 3.25 | 2.35 | 3.75 | 3.25 | 3.25 |
| Gross Returns | R.P | 15600 | 6580 | 5625 | 10075 | 10075 |
| (Rs./ha) | F.P | 13325 | N.C. | N.C | 7150 | N.C. |
| Fertilizer Input | R.P | 48:30:0 | 60:30:0 | 60:30:0 | 48:30:0 | 46:0:0 |
| (NPK kg/ha) | F.P | 0:0:0 | 0:0:0 | 0:0:0 | 0:0:0 | 0:0:0 |
| Fertilizer Cost | R.P | 546 | 626 | 626 | 545 | 309 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | N.C. |
| Compost | R.P | 18 | N.C | N.C | 17 | N.C. |
| (MT/ha) | F.P | 9 | N.C. | N.C. | 10 | N.C. |
| Insecticide | R.P | 0 | 280 | 280 | 0 | 400 |
| Cost (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 15054 | 5674 | 5625 | 9592 | 9365 |
| (Rs/ha) | F.P | 13325 | N.C. | N.C | 7463 | N.C. |
| Marginal Benifit Cost Ratio | | 3.3 | N.A | N.A | 4.26 | N.A. |
| Farmers | R.P | 5 | 10 | 10 | 5 | 8 |
| (Number) | F.P | 5 | N.C. | N.C. | 5 | 0 |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices.

* Supp. = Supplemental

N.C. = Not collected

N.A. = Not applicable

Table No.: 16

District: RUKUM V.P.: CHIBANG

Year: 82-83

| Season | | Winter | Summer | | Total Cropping Pattern |
|---|---|---|---|---|---|
| Cropping Pattern | | R+M - W | R+M - W | | W-R+M |
| Land Type | | Upland | Upland | | |
| Fertility Level | | Med-High | | | |
| Irrigation | | Supplemental | Rainfed | | |
| Crop | | Wheat | Rice | Maize | |
| Variety | R.P | RR-21 | Bindeswari | Arun | UP262-Bind.+Arun |
| | F.P | Local Imp. | Local | Local | Local |
| Yield | R.P | 3.56 | 3.62 | 2.11 | 9.3 |
| (MT/ha) | F.P | 2.2* | 2.85 | 1.44 | 6.5 |
| Price of Output | R.P | 3/50 | 3 | 2 | |
| (Rs/kg) | F.P | 3/50 | 3 | 2 | |
| Gross Returns | R.P | 12460 | 10860 | 4220 | 27540 |
| (Rs/ha) | F.P | 7700 | 2550 | 2880 | 20160 |
| Fertilizer Input | R.P | 80:40:0 | 60:30:0 | | 140:70:0 |
| (NPK Kg/ha) | F.P | 0:0:0 | 3.6:8:0 | | 3.6:8:0 |
| Fertilizer Cost | R.P | 954 | 715 | | 1669 |
| (Rs/ha) | F.P | 0 | 34 | | 34 |
| Compost | R.P | 6 | 7 | | 13 |
| (MT/ha) | F.P | 6 | 3.5 | | 9.5 |
| Insecticide | R.P | 0 | 71 | 32 | 103 |
| Cost (Rs/ha) | F.P | 0 | 36 | 16 | 52 |
| Gross Margin | R.P | 11506 | 14262 | | 25768 |
| (Rs/ha) | F.P | 7700 | 11344 | | 19044 |
| Marginal Benifit Cost Ratio | | 4 | 5 | | 4.4 |
| Farmers | R.P | 10 | 10 | 10 | 10. |
| (Number) | F.P | N.A. | 10 | 10 | 10 |

Note: R.P. = The recommended practices which were tested;

F.P. = The farmer's practices

N.C. = Not collected;

N.A. = Not applicable.

* From farmer's estimates.

Table No.: 17 SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Kaski, District, Rakhee Panchayat

Cropping Pattern: R-W-M

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date of Seeding | | | 3-12-82 | 3-12-82 | 16-4-83 | Total Cropping Patt. | |
| Date of Harvest | | | 16-4-83 | 16-4-83 | 26-7-83 | | |
| Land Type | | Irrig. lowland | Irrig. Lowland | Irrig. Lowland | Irrig. Lowland | | |
| Irrigation | | NC | 4 x | 4 x | None | | |
| Variety | R.P | K-39 | Up262 | RR21 | Arun | K39-UP262 Arun | K39-RR21 Arun |
| | F.P | Local | RR21 | RR21 | Arun | Loc.-RR21 Arun | Loc-RR21 Arun |
| Farmers | R.P | 2 | 4 | 4 | 3 | | |
| (Number) | F.P | General | 4 | 4 | 3 | | |
| Yield | R.P | 2.38 | 2.6 | 3.04 | .78 | 5.76 | 6.2 |
| (T/ha) | F.P | 2.3 | 2.67 | 2.67 | .73 | 5.7 | 5.7 |
| Price of Output | R.P | 2.14 | 3.09 | 3.09 | 3 | | |
| (Rs/kg | F.P | 2.14 | 3.09 | 3.09 | 3 | | |
| Gross Return | R.P | 5093 | 8009 | 9383 | 2340 | 15442 | 16816 |
| (Rs/ha) | F.P | 4922 | 8260 | 8260 | 2100 | 15282 | 15282 |
| Fert. Input | R.P | 60:0:0 | 60:30:0 | 60:30:0 | 45:0:0 | 165:30:0 | 165:30:0 |
| (NPK Kg/ha) | F.P | 30:15:0 | 35:18:0 | 35:18:0 | 20:0:0 | 85:33:0 | 85:33:0 |
| Fert. Cost | R.P | 406 | 622 | 622 | 342 | 1370 | 1370 |
| (Rs/ha) | F.P | 313 | 341 | 341 | 152 | 806 | 806 |
| Compost | R.P | 2.5 | 3.5 | 3.5 | 4 | 10 | 10 |
| (Ton/ha) | F.P | 6 | 3.5 | 3.5 | 4 | 13.5 | 13.5 |
| Insecticide cost | R.P | 0 | 0 | 0 | 101 | 101 | 101 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 4678 | 7387 | 8761 | 1897 | 13963 | 15336 |
| (Rs/ha) | F.P | 4609 | 7919 | 7919 | 2038 | 14566 | 14566 |
| M.B.C.R | | 1.8 | neg. | 4 | .5 | .24 | 2.3 |
| Seed Rate | R.P | | 120 | 120 | 30 | | |
| Kg/ha | F.P | | 100 | 100 | 35 | | |

Notes: R.P. = Recommended Practices

F.P. = Farmer's Practice

Table No.: 18 SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Lekhnath V.P., Kaski District,

Cropping Patter: R-W-M 1982-83

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date of Seeding' | | | 28-11-82 | 28-11-82 | 20-4-83 | Total Crop. Pattern | |
| Date of Harvest | | | 12/4/83 | 12/4/83 | 25/7/83 | | |
| Land Type | | Lowland | Lowland | Lowland | Lowland | | |
| Irrigation | | NC | 2 x | 2 x | 0 | | |
| Variety | R.P | K 39 | RR 21 | UP 262 | Arun | K39-RR-Ar | K39-UP-Ar. |
| | F.P | Local | RR 21 | RR 21 | Local | Loc-RR-Lo | Loc-RR-Lo. |
| Farmers | R.P | 3 | 5 | 5 | 4 | | |
| (Number) | F.P | General | 5 | 5 | 4 | | |
| Yield | R.P | 2.23 | 3.051 | 2.441 | 2.8 | 8.09 | 7.47 |
| (T/ha) | F.P | 2.2 | 1.638 | 1.638 | 2.1 | 5.94 | 5.94 |
| Price of Output | R.P | 2.14 | 3 | 3 | 3 | | |
| (Rs/kg | F.P | 2.14 | 3 | 3 | 3 | | |
| Gross Return | R.P | 4772 | 9171 | 7323 | 8400 | 22343 | 20495 |
| (Rs/ha) | F.P | 4708 | 4914 | 4914 | 6300 | 15922 | 15922 |
| Fert. Input | R.P | 60:0:0 | 60:30:0 | 60:30:0 | 45:0:0 | 165:30:0 | 165:30:0 |
| (NPK Kg/ha) | F.P | 24:9:0 | 37:18:0 | 37:18:0 | 45:0:0 | 106:27:0 | 106:27:0 |
| Fert. Cost | R.P | 406 | 621 | 621 | 342 | 1369 | 1369 |
| (Rs/ha) | F.P | 228 | 380 | 380 | 342 | 950 | 950 |
| Compost | R.P | 0 | 4-6 | 4-6 | 6.5 | 12 | 12 |
| (Ton/ha) | F.P | 3 | 4-6 | 4-6 | 7.5 | 16 | 16 |
| Insecticide Cost | R.P | 0 | 0 | 0 | 0 | 0 | 0 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 4366 | 8549 | 6701 | 8058 | 20973 | 19125 |
| (Rs/ha) | F.P | 4480 | 4534 | 4534 | 5958 | 14972 | 14972 |
| M.B.C.R | | .4 | 18 | 10 | | 15 | 11 |
| Seed Rate | R.P | | 120 | 120 | 30 | | |
| Kg/ha | F.P | | 100 | 100 | 40 | | |

Note: R.P. = Recommended Practice

F.P. = Farmer's Practice,
N.C = Not collected

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Table No.: 19 SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Bhalam V.P., Kaski District

1982-83

| Cropping Pattern' | | R-W | R-W | R-W-M | R-W-M |
|---|---|---|---|---|---|
| Date of Seeding | | 39/8/20 | 39/8/20 | 39/8/20 | 39/8/20 |
| Date of Harvest | | 39/12/29 | 39/12/29 | 40/1/3 | 40/1/3 |
| Land Type | | Rainfed Lowland | Rainfed Lowland | Irrig. Lowland | Irrig. Lowland |
| Irrigation | | 0 | 0 | 1 | 1 |
| Variety | R.P | RR 21 | UP 262 | RR 21 | UP 262 |
| | F.P | Local | Local | Local | Local |
| Farmers | R.P | 5 | 5 | 5 | 5 |
| (Number) | F.P | 5 | 5 | 5 | 5 |
| Yield | R.P | 1.992 | 2.195 | 4.1 | 4.4 |
| (T/ha) | F.P | 1.489 | 1.489 | 3.9 | 3.9 |
| Price of Output | R.P | 2.25 | 2.25 | 2.25 | 2.25 |
| (Rs/kg) | F.P | 2.25 | 2.25 | 2.25 | 2.25 |
| Gross Return | R.P | 4482 | 4939 | 9225 | 9900 |
| (Rs/ha) | F.P | 3350 | 3350 | 8775 | 8775 |
| Fert. Input | R.P | 60:30:0 | 60:30:0 | 60:30:0 | 60:30:0 |
| (NPK kg/ha) | F.P | 60:30:0 | 60:30:0 | 15:8:0 | 15:8:0 |
| Fert. Cost | R.P | 621 | 621 | 621 | 621 |
| (Rs/ha) | F.P | 621 | 621 | 155 | 155 |
| Compost | R.P | 17 | 17 | 9.5 | 9.5 |
| (Ton/ha) | F.P | 19 | 19 | 7 | 7 |
| Insecticide Cost | R.P | 0 | 0 | 0 | 0 |
| (Rs/ha) | F.P | 0 | 0 | 0 | 0 |
| Gross Margin | R.P | 3671 | 4128 | 8414 | 9089 |
| (Rs/ha) | F.P | 2729 | 3507 | 8620 | 8620 |
| M.B.C.R* | | 6 | 8.4 | .7 | 1.7 |
| Seed Rate | R.P | 120* | 120* | 120* | 120* |
| (kg/ha) | F.P | 64* | 64* | 64* | 64* |

Notes: R.P. = Recommended Practice,

F.P. = Farmer's Practice

* While computing the MBCR, the significant difference in seed cost is also included (i.e., 190 Rs.)

Table No. 20: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Ghachowk Village Panchayat, Kaski District

Cropping Pattern: Wheat - Maize - Rice; Year: 1982/1983

| | | | | | | |
|---|---|---|---|---|---|---|
| Date of Seeding | | 11/11/82 | 23/11/82 | 15/4/83 | NC | Total Cropping Pattern |
| Date of Harvest | | 9/04/83 | 21/04/83 | 28/7/83 | NC | |
| Land Type | | Irrigated Lowland | Irrigated Lowland | Irrigated Lowland | Irrig. Lowland | |
| Irrigation | | 2X | 2X | 0 | 4X | |
| Variety: | R.P. | RR 21 | UP 262 | Arun | K-39 | UP262-Arun-K39 |
| | F.P. | Local | Local | Local | Local | Locals |
| Farmers (Number) | R.P. | 4 | 4 | 5 | 5 | |
| | F.P. | 4 | 4 | 5 | 5 | |
| Yield (Ton/Ha.) | R.P. | 2.856 | 2.978 | 4.1 | 4.22 | 11.3 |
| | F.P. | 1.325 | 1.325 | 2.3 | 2.46 | 6.1 |
| Price of Output (Rs./Kg.) | R.P. | 2.35 | 2.35 | 3 | 2.5 | |
| | F.P. | 2.35 | 2.35 | 3 | 2.5 | |
| Gross Return (Rs./Ha.) | R.P. | 6712 | 6998 | 12300 | 10550 | 29848 |
| | F.P. | 3114 | 3114 | 6900 | 6150 | 16164 |
| Fertilizer Input ($N$, $P_2O_5$, & $K_2O$ kg/ha.) | R.P. | 60:30:0 | 60:30:0 | 60:0:0 | 45:0:0 | 165:30:0 |
| | F.P. | 0 | 0 | 60:0:0 | 9:0:0 | 69: 0:0 |
| Fertilizer Cost* (Rs./Ha.) | R.P. | 971 | 971 | 587 | 442 | 2000 |
| | F.P. | 0 | 0 | 587 | 90 | 677 |
| Compost (Ton/Ha.) | R.P. | 6-9 | 6-9 | 6 | 4 | 17-18 |
| | F.P. | 6-9 | 6-9 | 6 | 4 | 17-18 |
| Insecticide Cost (Rs./Ha.) | R.P. | 0 | 0 | 0 | 400 | 400 |
| | F.P. | 0 | 0 | 0 | 0 | 0 |
| Gross Margin (Rs./Ha.) | R.P. | 5560 | 5856 | 11593 | 9708 | 27157 |
| | F.P. | 3114 | 3114 | 6163 | 6032 | 15309 |
| Seed Rate** (Kg./Ha.) | R.P. | 120 | 120 | 40 | 40 | |
| | F.P. | 64 | 64 | 50 | 50 | |
| M.B.C.R. | | 3.2 | 3.5 | NA | 6 | 7.8 |

Notes: R.P. = Recommended Practice; F.P. = Farmer's Practice
NA = Not Available; M.B.C.R. = Marginal Benefit Cost Ratio
NC = Not Collected
* = Included in the fertilizer costs is the portering charge from Hyangja Coop. (i.e., at 50Rs per 50 kg for one day's haul)
** = The difference in seed cost between R.P. and F.P. is included in the Gross Margin and M.B.C.R. figures.

Table No. 21: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Ghachowk Village Panchayat, Kaski District

Cropping Pattern: Maize - Rice - Fallow; Year 1983

| | | | | |
|---|---|---|---|---|
| Date of Seeding | | 9/3/1983 | NC | Total Cropping Pattern |
| Date of Harvest | | 18/7/1983 | NC | |
| Land Type | | Lowland | Lowland | |
| Irrigation | | 0 | 4X | |
| Variety: | R.P. | Khumal Yellow | K-39 | Khumal Y.-K-39 |
| | F.P. | Local | Local | Locals |
| Farmers | R.P. | 5 | 5 | |
| (Number) | F.P. | 5 | 5 | |
| Yield | R.P. | 6 | 4.2 | 10.2 |
| (Ton/Ha.) | F.P. | 2.2 | 2.5 | 4.7 |
| Price of Output | R.P. | 3 | 2.50 | |
| (Rs./Kg.) | F.P. | 3 | 2.50 | |
| Gross Return | R.P. | 18000 | 10500 | 28500 |
| (Rs./Ha.) | F.P. | 6600 | 6250 | 12850 |
| Fertilizer Input | R.P. | 60:0:0 | 45:0:0 | 125:0:0 |
| (N, $P_2O_5$, & $K_2O$ kg/ha.) | F.P. | 60:0:0 | 0 | 60:0:0 |
| Fertilizer Cost* | R.P. | 587 | 442 | 1029 |
| (Rs./Ha.) | F.P. | 587 | 0 | 8587 |
| Compost | R.P. | 5 | 4 | 9 |
| (Ton/Ha.) | F.P. | 0 | 4 | 4 |
| Insecticide Cost | R.P. | 0 | 0 | 0 |
| (Rs./Ha.) | F.P. | 0 | 0 | 0 |
| Gross Margin | R.P. | 17413 | 10058 | 27471 |
| (Rs./Ha.) | F.P. | 5973 | 6225 | 12198 |
| Seed Rate ** | R.P. | 40 | 40 | |
| (Kg./Ha.) | F.P. | 50 | 50 | |
| M.B.C.R. | | NA | 10.2 | [illegible] |

Notes:
R.P. = Recommended Practice
F.P. = Farmer's Practice
M.B.C.R. = Marginal Benefit Cost Ratio
NC = Not Collected; NA = Not Available
* - Included in the putting fertilizer cost is the portring charge
** - The difference in seed cost between R.P. and F.P. is included in the Gross Margin and M.B.C.R. figures.

Table No. 22: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Ghachowk Village Panchayat, Kaski District

Cropping Pattern: Wheat - Maize / Fingermillet; Year: 1982/1983

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date of Seeding | | NC | NC | NC | NC | Total Cropping Pattern | |
| Date of Harvest | | NC | NC | NC | X | | |
| Land Type | | Upland | Upland | Upland | X | | |
| Irrigation | | 0 | 0 | 0 | 0 | | |
| Variety: | R.P. | RR 21 | UP 262 | Khumal | F.Millet- | RR21-Kh.Y. | UP262-Kh. Y. |
| | F.P. | Local | Local | Local | Data Not- | Locals | Local |
| Farmers | R.P. | 5 | 5 | 5 | Collected. | | |
| (Number) | F.P. | 5 | 5 | 5 | | | |
| Yield | R.P. | 2.344 | 2.465 | 7.3 | | 9.644 | 9.765 |
| (Ton/Ha.) | F.P. | 1.31 | 1.31 | 3.8 | | 5.11 | 5.11 |
| Price of Output | R.P. | 2.35 | 2.35 | 3 | | | |
| (Rs./Kg.) | F.P. | 2.35 | 2.35 | 3 | | | |
| Gross Return | R.P. | 5508 | 5792 | 21900 | | 27408 | 27692 |
| (Rs./Ha.) | F.P. | 3079 | 3079 | 11400 | | 14479 | 14479 |
| Fertilizer Input | R.P. | 60:0:0 | 60:0:0 | 60:30:0 | | 120:30:0 | 120:30: |
| (N, $P_2O_5$, & $K_2O$ kg/ha.) | F.P. | 0 | 0 | 0 | | 0 | 0 |
| Fertilizer Cost* | R.P. | 587 | 587 | 971 | | 1558 | 1558 |
| (Rs./Ha.) | F.P. | 0 | 0 | 0 | | 0 | 0 |
| Compost | R.P. | 7-9 | 7-9 | 7 | | 15 | 15 |
| (Ton/Ha.) | F.P. | 7-9 | 7-9 | 7 | | 15 | 15 |
| Insecticide Cost | R.P. | 0 | 0 | 0 | | 0 | 0 |
| (Rs./Ha.) | F.P. | 0 | 0 | 0 | | 0 | 0 |
| Gross Margin | R.P. | 4761 | 5045 | 20929 | | 25690 | 25974 |
| (Rs./Ha.) | F.P. | 3079 | 3079 | 11400 | | 14479 | 14479 |
| Seed Rate** | R.P. | 120 | 120 | NC | | | |
| (Rs./Kg.) | F.P. | 64 | 64 | NC | | | |
| M.B.C.R. | | 3.25 | 3.6 | 10.8 | | 7.6 | 7.8 |

Notes: R.P. = Recommended Practice; F.P. = Farmers' Practice
N.C. = Not Collected; M.B.C.R. = Marginal Benefit Cost Ratio

* = Included in the fertilizer costs is the portering charge
** = The difference in seed cost between R.P. and F.P. is included in the Gross Margin and M.B.C.R. figures.

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Table 23: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Site Manusmara Village Panchayat, Dhankaul (Sarlahi)

Cropping Pattern: R-R-W, R-M-Mung, R-W-Mu; Crop: Rice-Mungbean

| Cropping Pattern | | R-R-W | R-R-W | R-M-Mung | R-W-Mung | R-W-Mung |
|---|---|---|---|---|---|---|
| Land Type | | Medium Soil | Medium Soil | Medium Soil | Medium Soil | Medium Soil |
| Irrigation | | MC | MC | MC | MC | MC |
| Variety: | R.P. | Laxmi | CH-45 | Laxmi | CH-45 | Pusa Baisakh |
| | F.P. | Local | Local | Local | Local | Local |
| Farmers (Number) | R.P. | 4 | 4 | 6 | 1 | 4 |
| | F.P. | 4 | 4 | 6 | 1 | 4 |
| Yield (Ton/Ha.) | R.P. | 2.85 | 2.63 | 2.73 | 2.8 | 1.25 |
| | F.P. | 2.43 | 2.33 | 2.18 | 2.45 | 1.05 |
| Price of Output (Rs./Kg.) | R.P. | 2 | 2 | 2 | 2 | 5 |
| | F.P. | 2 | 2 | 2 | 2 | 5 |
| Gross Return (Rs./Ha.) | R.P. | 5700 | 5260 | 5460 | 5600 | 6250 |
| | F.P. | 4860 | 4660 | 4360 | 4900 | 5250 |
| Fertilizer Input ($N$, $P_2O_5$, & $K_2O$ kg/ha.) | R.P. | 90:30:0 | 60:20:0 | 90:30:0 | 60:20:0 | 20:20:20 |
| | F.P. | 60:30.0 | 40:20:0 | 60:30:0 | 40:20:0 | 20:20:20 |
| Fertilizer Cost (Rs./Ha.) | R.P. | 1000 | 668 | 1000 | 668 | 443 |
| | F.P. | 752 | 506 | 752 | 506 | 443 |
| Compost (Ton/Ha.) | R.P. | NC | NC | NC | NC | NC |
| | F.P. | NC | NC | NC | NC | NC |
| Insecticide Cost (Rs./Ha.) | R.P. | 200 | 200 | 200 | 200 | 100 |
| | F.P. | 200 | 200 | 200 | 200 | 100 |
| Gross Margin (Rs./Ha.) | R.P. | 4500 | 4392 | 4260 | 4732 | 5707 |
| | F.P. | 4108 | 3954 | 3600 | 4394 | 4707 |
| M.B.C.R. | | 3.4 | 3.7 | 4.4 | 4.3 | NA |

Notes:
R.P. = Recommended Practice
F.P. = Farmer's Practice
MC = Manusmara Canal
NC = Not Collected
NA = Not Available
MBCR = Marginal Benefit Cost Ratio.

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Table No. 24: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Different Panchayats in Sarlahi District along the Manusmara canal; and the last column at Birendra Nagar V.P., Chitwan District

Year 1982/1983

| Cropping Pattern | | W-Mung-R | W-R-R | R-W-Mung | R - W - F |
|---|---|---|---|---|---|
| Date of Seeding | | NC | NC | NC | NC |
| Date of Harvest | | NC | NC | NC | NC |
| Land Type | | Lowland | Lowland | Lowland | Lowland |
| Irrigation | | 2X | 2X | Canal | Partial |
| Variety : | R.P. | UP 262 | UP 262 | Pusa B. | RR 21 |
| | F.P. | RR 21 | RR 21 | Local | Local |
| Farmers | R.P. | 4 | 5 | 1 | 3 |
| (Number) | F.P. | 4 | 5 | 1 | 3 |
| Yield | R.P. | 3.75 | 3.85 | 1.4 | 2.753 |
| (Ton/ha.) | F.P. | 2.3 | 2.2 | 1.15 | 1.912 |
| Price of Output | R.P. | 2.55-3.00 | 2.55-3 | 5 | 3 |
| (Rs./Kg.) | F.P. | 2.55-3.00 | 2.55-3 | 5 | 3 |
| Gross Return | R.P. | 9645 | 9764 | 7000 | 8259 |
| (Rs./Ha.) | F.P. | 6248 | 6044 | 5750 | 5737 |
| Fert. Input | R.P. | 80:40:0 | 80:40:0 | 20:20:20 | 60:30:0 |
| (N, $P_2O_5$, & $K_2O$ kg/ha) | F.P. | 54:32:8 | 43:23:0 | 35:20: 0 | 0 |
| Fertilizer Cost | R.P. | 834 | 834 | 443 | 626 |
| (Rs./Ha.) | F.P. | 623 | 458 | 458 | 0 |
| Compost | R.P. | 0 | 1 | NC | 0 |
| (Ton/Ha.) | F.P. | 0 | 1 | NC | 0 |
| Insecticide Cost | R.P. | 0 | 1 | - | 0 |
| (Rs./Ha.) | F.P. | 0 | 1 | | 0 |
| Gross Margin | R.P. | 8811 | 8930 | 6457 | 7633 |
| (Rs./Ha.) | F.P. | 5625 | 5586 | 5207 | 5111 |
| M.B.C.R. | | 16 | 10 | Negative | 4 |

Notes: R.P. = Recommended Practice
F.P. = Farmer's Practice
NC = Not Collected

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Table No. 25: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location: Jhanj V.P., Rautahat District, 1983

| Cropping Pattern : | | R-W-Dh. | R-W-R+ | R-W-Mung | R-W-M |
|---|---|---|---|---|---|
| Date of Seeding | R.P. | 22/2/40 | 20/2/40 | 21/2/40 | 19/2/40 |
| Date of Harvest | R.P. | 26/7/40 | 18/6/40 | 25/7/40 | 15/7/40 |
| Land Type | | Irrigated Lowland | Irrigated Lowland | Irrigated Lowland | Irrigated Lowland |
| Irrigation | | NC | NC | NC | NC |
| Variety: | R.P. | Sabitri | Laxmi | Masuli | Janaki |
| | F.P. | Local | Local | Local | Local |
| Farmers | R.P. | 5 | 5 | 5 | 4 |
| | F.P. | 5 | 5 | 5 | 4 |
| Yield | R.P. | 3.725 | 3.218 | 3.514 | 3.55 |
| (T/ha.) | F.P. | 1.935 | 1.935 | 1.856 | 1.935 |
| Price of Output | R.P. | 2.5 | 2.5 | 2.5 | 2.5 |
| (Rs/kg) | F.P. | 2.5 | 2.5 | 2.5 | 2.5 |
| Gross Returns | R.P. | 9313 | 8045 | 8785 | 8875 |
| (Rs./ha.) | F.P. | 4838 | 4838 | 4640 | 4838 |
| Fert. Input | R.P. | 60:0:0 | 60:0:0 | 60:0:0 | 60:0:0 |
| (N, $P_2O_5$, $K_2O$, kg/h) | F.P. | 26:6:0* | 26:6:0* | 26:6:0* | 30:30:0 |
| Fert. Cost | R.P. | 457 | 457 | 457 | 457 |
| (Rs/ha.) | F.P. | 250 | 250 | 250 | 488 |
| Compost | R.P. | NC | NC | NC | NC |
| (T/ha.) | F.P. | NC | NC | NC | NC |
| Insecticide Cost | R.P. | NC | NC | NC | NC |
| (Rs/ha.) | F.P. | NC | NC | NC | NC |
| Gross Margin | R.P. | 8856 | 7588 | 8328 | 8418 |
| (Rs./ha.) | F.P. | 4488 | 4588 | 4390 | 4350 |
| M.B.C.R. | | 22 | 15 | 20 | NA |
| Seeding Rate | R.P. | 50 | 50 | 50 | 50 |
| (kg/ha.) | F.P. | NC | NC | NC | NC |

Notes: R.P. = Recommended Practice
F.P. = Farmer's Practice
M.B.C.R. = Marginal Benefit Cost Ratio
N.C. = Not Collected
N.A. = Not Applicable

* - Fertilizer input figure taken from Mohammedpur V.P. Initial Site Description Report for PVTs.

+ - No spring rice for the R-W-R pattern, and no spring maize for the R-W-M pattern.

Table No. 26: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location : Hansporia V.P., Sunsari District (Column 1 and 2), and Dulari V.P. Morang District; Year: 1982.

| Cropping Patterns | | R-W-Mung | R-W-Dh.+ | R-W-Dh.+ | R-W-Dh.+ |
|---|---|---|---|---|---|
| Date of Seeding | R.P. | NC | NC | 2039/2/5 | 2039/2/5 |
| Date of Harvest | R.P. | NC | NC | 2039/7/24 | 2039/7/26 |
| Land Type | | Lowland | Lowland | Lowland | Lowland |
| Irrigation | | 3 X | 3 X | 4 X | 1 X |
| Variety: | R.P. | Masuli | Durga | Janaki | Sabitri |
| | F.P. | Local* | Masuli | Local | Masuli |
| Farmers | R.P. | 5 | 5 | 10 | 5 |
| (Number) | F.P. | 5 | 5 | 10 | 5 |
| Yield | R.P. | 3.742 | 3.94 | 3.83 | 3.6 |
| (T/ha) | F.P. | 3.24 | 3.42 | 3.09 | 3.14 |
| Price of Outpur | R.P. | 2.75 | 2.50 | 2.5 | 2.5 |
| (Rs/kg) | F.P. | 2.75 | 2.75 | 2.5 | 2.75 |
| Gross Returns | R.P. | 10291 | 9850 | 9575 | 9000 |
| (Rs/ha.) | F.P. | 8910 | 9405 | 7725 | 8635 |
| Fert. Input | R.P. | 60:0:0 | 60:0:0 | 60:0:0 | 60:0:0 |
| (NPK/kg/ha) | F.P. | 6:0:0 | 29:0:0 | 29:0:0 | 29:0:0 |
| Fert. Cost | R.P. | 406 | 406 | 406 | 406 |
| (Rs/ha.) | F.P. | 41 | 196 | 196 | 196 |
| Compost | R.P. | 0 | 1 | 0 | 1 |
| (Ton/ha.) | F.P. | 3 | 4.5 | 6 | 5 |
| Insecticide Cost | R.P. | 0 | 0 | 523 | 205 |
| (Rs/ha.) | F.P. | 0 | 0 | 0 | 0 |
| Gross Margin | R.P. | 9885 | 9444 | 8646 | 8389 |
| (Rs/ha.) | F.P. | 8869 | 9209 | 7529 | 8439 |
| M.B.C.R. | | 3.9 | 2.1 | 2.5 | 0.9 |

Note: R.P. = Recommended Practice
F.P. = Farmer's Practice
M.B.C.R. = Marginal Benefit Cost Ratio
NC = Not Collected

* - Local with 2 farmers and Masuli with 3

\+ - Dhaincha.

Table No. 27: SUMMARY OF THE AGRONOMIC AND ECONOMIC RESULTS OF PRE-PRODUCTION VERIFICATION TRIALS

Location : Lipani Birta V.P., Parsa District (Column 1, 2 and 3 and Yadukuwa V.P., Dhanusha District; Year: 1983

| Cropping Patterns | | R-Lentil | R-W-F | R-Mustard | R-W-Fallow |
|---|---|---|---|---|---|
| Date of Seeding | | 29/2/40 | 29/2/40 | 30/2/40 | 24/2/40 |
| Date of Harvest | | 21/6/40 | 24/6/40 | 10/6/40 | 2/7/40 |
| Land Type | | Rainfed Lowland | Rainfed Lowland | Rainfed Lowland | Irrigated Lowland |
| Irrigation | | NC | NC | NC | NC |
| Variety: | R.P. | Bindeshwari (IET 1444) | Bindeshwari(IET 14-44) | CH 45 | Janaki |
| | F.P. | Local | Local | Local | Local |
| Farmers (Number) | R.P. | 4 | 5 | 5 | 5 |
| | F.P. | 4 | 5 | 5 | 5 |
| Yield (T/ha) | R.P. | 2.77 | 2.115 | 2.40 | 4.048 |
| | F.P. | 2.18 | 2.336 | 2.06 | 2.829 |
| Price of Outpur (Rs/kg) | R.P. | 2.5 | 2.5 | 2.5 | 2.5 |
| | F.P. | 2.5 | 2.5 | 2.5 | 2.5 |
| Fross Return (Rs/ha.) | R.P. | 6925 | 5262 | 6000 | 10120 |
| | F.P. | 6250 | 5840 | 5158 | 7072 |
| Fert. Input (NPK, kg/ha) | R.P. | 60:0:0 | 60:0:0 | 60:0:0 | 60:0:0 |
| | F.P. | 45:12:0 | 45:12:0 | 45:12:0 | 30:30:0 |
| Fert. Cost (Rs/ha.) | R.P. | 457 | 457 | 457 | 457 |
| | F.P. | 370 | 370 | 370 | 488 |
| Compost (T/ha.) | R.P. | NC | NC | NC | NC |
| | F.P. | NC | NC | NC | NC |
| Insecticide Cost (Rs/ha.) | R.P. | NC | NC | NC | NC |
| | F.P. | NC | NC | NC | NC |
| Gross Margin (Rs/ha.) | R.P. | 6468 | 4805 | 5543 | 9663 |
| | F.P. | 5855 | 5470 | 4788 | 6585 |
| M.B.C.R. | | 7 | NA | 10 | NA |
| Seed Rate (kg/ha.) | R.P. | 50 | 50 | 50 | 50 |
| | F.P. | NC | NC | NC | NC |

Note: R.P. = Recommended Practice
F.P. = Farmer's Practice
M.B.C.R. = Marginal Benefit Cost Ratio
NC = Not Collected
NA = Not Applicable

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Preface to the Appendices

There are four appendices attached to this report. They can be considered as scientific tools to assist agriculturists conduct their own PVTs or other result demonstration trials. The following paragraphs briefly describe how these tools can be used.

As with any scientific study, PVTs follow a prescribed methodology. The first step in PVTs is to observe what already exists, which is what the questionnaire (appendix one) is designed for. The accompanying data summary sheet (appendix two) is where the collected information is concisely described. After a PVT site is identified from examination of the site description and/or data summary sheet, the recommended technology can be selected. Once this technology is instituted with farmers in farmer's fields, continuous monitoring of the trials is necessary to insure reliable data for results' interpretation.

The data collected from PVTs (see appendix three) - both recommended and farmers practices - is then comparatively analyzed, yielding the necessary information required to assess how well the recommended and farmers' technology performed. If proper PVT methodology had been followed, from these agronomic and economic results of PVTs, together with the site description, the agricultural developer could be then able to confidently promote an appropriate recommended technology for a particular area.

Appendix four is a detailed outline and schedule of the training program on how to conduct PVTs, which is taught by a Cropping Systems Agronomist and Economist. It is especially designed for future reference by field staff after the training program, containing the necessary formulae and succinct descriptions of the step-by-step PVT process.

In order for CSP technology to be more easily transferable, these appendices have also been written in Nepali and can be obtained from the National Cropping Systems Program at Khumaltar.

Brief Discussion on Site Descriptions

Site descriptions* are on essential part of the PVT process. With the information gathered from them, agriculturists can knowledgeably determine which sites are better suited for PVTs, what technology to recommend alongside farmers' traditional practices and in general, better understand what are some of the major impediments to agricultural development for a particular area.

For Nepal's PVTs, the site description process has not always worked according to the methodology. In certain areas, site descriptions were not conducted, or if conducted, they were processed after the trial had already been established, thereby rendering costly site analysis less useful. Behind these shortcomings, there has also been a persistent difficulty convincing local staff and other government officials of the importance and necessity of conducting site descriptions before the trials begin. The existing agricultural extension system normally does not conduct surveys. As a result, ICP-CSP's socio-economic unit often went ahead, conducting surveys without significant involvement by local staff. It can be said that this approach adopted by ICP-CSP enabled CSP to gather an optimal amount of information for PVTs but, at the same time, it also forestalled the development of a transferable (for Nepali ADO conditions) site description process.

This past year, however, CSP working together with RCUP staff, redesigned a simplified site description questionnaire made for relatively easy use by local ADO staff. Appendix one is an example of this questionnaire. It asks for only the minimum amount of information necessary to compile an on-site data summary sheet (Appendix II) : information on predominant cropping patterns, land types, varieties grown, yields and inputs used.** It has already successfully worked in several new PVT areas, and it is hoped that other ADO: and researchers will utilize this tool for their own work.

* - For a more detailed presentation on recent modifications in site description, see Marlin Van Der Veen, "Rapid Site Description for Farming Systems Research", a discussion paper for the 14th Asian Farming Systems Working Group Meetings, Hangzhau and Beijing China, Oct. 25-29, 1983, available from IRRI.

** - Note that site descriptions should also include an evaluation of past FFTs, minikits, management trials, etc., for the areas under study.

Appendix # 1

## SITE DESCRIPTION QUESTIONNAIRE FOR PRE-PRODUCTION VERIFICATION TRIALS

District : _____ , Panchayat : _____

Ward No. : _____ , Village : _____

---

A) Description of the land for ward number(s) : _____ Total Ropanis

1. Khet (Lowland)
   a) Fully irrigated _____
   b) Seasonally irrigated or half irrigated _____
   c) Non-irrigated or rainfed _____
2. Bari (Upland) _____
3. Tar land (flat lowland in the hills) _____

B) 1. Is cultivated land kept fallow during any time of the year?

Yes _____ No _____

If yes, what type of land : Khet, Bari or both? _____

2. Description of Fallow Khet land
   a) What percentage is kept fallow? _____
   b) Reasons for keeping fallow _____
   c) From which month to when, is it kept fallow? _____
   d) In your opinion, what types of crops are suitable to cultivate in this type of fallow khet land? _____

3. Description of Fallow Bari Land
   a) What percentage is kept fallow? _____
   b) Reasons for being fallow _____
   c) From which month to when, is it kept fallow? _____
   d) In your opinion, what types of crops are suitable to cultivate in this type of fallow Bari land? _____

C) 1. In this ward no.____ , what crops were cultivated on the total Khet land last year? _____

_____

2. Description of crops cultivated in Khet

| | Cultivated Crops | Percentage of Cultivated Area/Crop |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |

D) 1. What are the main cropping patterns in Khet land in Ward No._____ of this Panchayat?

_____ _____ _____

_____ _____ _____

_____ _____ _____

2. When are the different crops planted and harvested in Khet land?

| | Name of the Crop | Planting Date | Harvesting Date |
|---|---|---|---|
| 1. | .... ... ... ... | ... ... ... | ... ... ... ... |
| 2. | .... ... ... ... | ... ... ... | ... ... ... ... |
| 3. | .... ... ... ... | ... ... ... | ... ... ... ... |
| 4. | .... ... ... ... | ... ... ... | ... ... ... ... |
| 5. | .... ... ... ... | ... ... ... | ... ... ... ... |

E) 1. In this Ward No. _____, which crops were cultivated on total Bari land last year? _____

_____

2. Description of crops cultivated on Bari.

| | Cultivated Crops | Percentage of Cultivated Area per Crop |
|---|---|---|
| 1. | Maize | |
| 2. | Millet | |
| 3. | Upland Rice | |
| 4. | Wheat | |
| 5. | ..... | |

F) 1. What are the main cropping patterns in Bari land in Ward No. _____ of this Panchayat?

..... ..... .....

..... ..... .....

..... ..... .....

2. When are the different crops planted and harvested in Bari land?

| Name of the Crop | Planting Date | Harvesting Date |
|---|---|---|
| 1. Maize | | |
| 2. Fingermillet | | |
| 3. | | |
| 4. | | |
| 5. | | |

G) What percentage of improved and local varieties are grown in Khet land?

| Name of the Crop | Name of Improved Variety | Percentage | Name of local Variety | Percent |
|---|---|---|---|---|
| 1. Rice | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| 2. Wheat | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| 3. Maize | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| | ..... | ..... | ..... | ..... |
| 4. | ..... | ..... | ..... | ..... |
| 5. | ..... | ..... | ..... | ..... |

H) 1. What percentage of improved local varieties are grown in Bari land?

| | Name of the Crop | Name of Improved Variety | Percentage | Name of Local Variety | Percentage |
|---|---|---|---|---|---|
| a) | Maize | ..... | ..... | ..... | ..... |
| | | ..... | ..... | ..... | ..... |
| b) | Wheat | ..... | ..... | ..... | ..... |
| | | ..... | ..... | ..... | ..... |
| c) | Millet | ..... | ..... | ..... | ..... |
| | | ..... | ..... | ..... | ..... |
| d) | Upland Rice | ..... | ..... | ..... | ..... |
| | | ..... | ..... | ..... | ..... |
| e) | _____ | ..... | ..... | ..... | ..... |
| | | ..... | ..... | ..... | ..... |

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I) What is the average yield per Ropani of the following crops (local or improved)?

| Name of the Crop | Name of Variety | Yield per Ropani |
|---|---|---|
| 1. Rice | ..... | ..... |
| | ..... | ..... |
| 2. Wheat | ..... | ..... |
| | ..... | ..... |
| 3. Maize | ..... | ..... |
| | ..... | ..... |
| 4. Fingermillet | ..... | ..... |
| | ..... | ..... |
| 5. Barley | ..... | ..... |
| | ..... | ..... |
| 6. Uwa | ..... | ..... |
| | ..... | ..... |
| 7. Potato | ..... | ..... |
| | ..... | ..... |
| 8. _____ | ..... | ..... |
| | ..... | ..... |

J) How much seed do you apply (local or improved) for the following crops?

| Crops | Name of Variety | Seed Rate Per Ropani |
|---|---|---|
| 1. Rice | ..... | ..... |
| | ..... | ..... |
| 2. Wheat | ..... | ..... |
| | ..... | ..... |
| 3. Maize | ..... | ..... |
| | ..... | ..... |
| 4. Fingermillet | ..... | ..... |
| | ..... | ..... |
| 5. Barley | ..... | ..... |
| | ..... | ..... |
| 6. Uwa | ..... | ..... |
| | ..... | ..... |
| 7. Potato | ..... | ..... |
| | ..... | ..... |

| | | |
|---|---|---|
| 8. _____ | ..... | ..... |
| | ..... | ..... |
| 9. _____ | ..... | ..... |
| | ..... | ..... |

K) In Ward No. _____, what percentage of total farmers use chemical fertilizer? What is the average amount of chemical fertilizer applied per Ropani for those farmers who use it?

| Crop | Variety | Percentage of farmers Using Chemical Fert. | Ave. Chemical Fertilizer Use Per Ropani (Of those Farmers Who Use it) |
|---|---|---|---|
| 1. Rice | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 2. Wheat | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 3. Maize | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 4. F.millet | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 5. Barley | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 6. Potato | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 7. Uwa | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 8. _____ | Improved | ..... | ..... |
| | Local | ..... | ..... |
| 9. _____ | Improved | ..... | ..... |
| | Local | ..... | ..... |

L) What are the major agricultural problems for the farmers of Ward No. ____?

1. Lack of irrigation facilities _____
2. Hail _____
3. Lack of compost fertilizer _____
4. Insects and Diseases _____
5. Unavailability of chemical fertilizer _____
6. Lack of money to purchase improved seed and chemical fertilizer ____

_____

8. Lack of technical knowledge about improved farming techniques _____

_____

9. Other problems _____

EXTRA COMMENTS BY INTERVIEWER

_____

_____

_____

_____

_____

APPENDIX 2:

DATA SUMMARY SHEET

Wards _____, Panchayat _____, District _____

GENERAL:

Rainfall _____mm/yr.; Number of wet months _____; Hail _____
Altitude _____m.a.s.l.; Soil Texture _____, pH____; O.M.____; N___; P___; K___

LAND TYPE MIX AND USE:

| Land Type | % of Area | Main Cropping Patterns | | | | | | Ropanis |
|---|---|---|---|---|---|---|---|---|
| | | Pattern | % | Pattern | % | Pattern | % | |
| Irrigated Lowland | | | | | | | | |
| Rainfed Lowland | | | | | | | | |
| Upland | | | | | | | | |

VARIETIES GROWN, YIELDS AND INPUTS USED:

| | Crop | Variety | % of Variety Crop Area | Mean Yield/ Ropani | % Using Ferti-lizer | Amount Used* | % Using Compost* | Amount Used/ Ropani | Seed Rate/ Ropani |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Rice | 1. | | | | | | | |
| | | 2. | | | | | | | |
| | | 3. Local | | | | | | | |
| 2 | Wheat | 1. | | | | | | | |
| | | 2. | | | | | | | |
| | | 3. Local | | | | | | | |
| 3 | Maize | 1. | | | | | | | |
| | | 2. | | | | | | | |
| | | 3. Local | | | | | | | |
| 4 | Mustard | | | | | | | | |
| 5 | F.Millet | | | | | | | | |
| 6 | Potato | 1. | | | | | | | |
| | | 2. | | | | | | | |
| 7 | Buck - Wheat | 1. | | | | | | | |
| | | 2. | | | | | | | |
| 8 | Soybean | 1. | | | | | | | |
| | | 2. | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |

* Of those using

SUGGESTED PRE-PRODUCTION VERIFICATION TRIALS:

| Land Type | Cropping Patterns | Farmers' Practices to Superimpose | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Crop | Fert. | Compost | Crop | Fert. | Compost | Crop | Fert | Com |
| Irrigated Lowland | | | | | | | | | | |
| Rainfed Lowland | | | | | | | | | | |
| Upland | | | | | | | | | | |

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Appendix 3:

DATA TO BE COLLECTED FROM THE PRE-PRODUCTION VERIFICATION TRIALS

| | Recommended practices | Farmer's local practices |
|---|---|---|
| Size of plot | | |
| Variety | | |
| Amount of seed used | | |
| Spacing (in cms) | | |
| Seedlings for hill (rice) | | |
| Fertilizer used (kind and amount) | | |
| Basal Fertilizer | | |
| Dose | | |
| Date of Application | | |
| First top-dressing | | |
| Dose | | |
| Date of Application | | |
| Compost (How many kg per doko (Best estimate)) | | |
| Insecticides | | |
| Type | | |
| Amount | | |
| Date | | |
| Seeding date | | |
| Transplanting date (Rice, F. millet) | | |
| Harvesting date | | |
| Size of sample ($m^2$) | | |
| Sample dry weight | | |

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Irrigation (Date and hours per application)

1. _____

2. _____

3. _____

4. _____

Comments:

_____

1. In the trial were there any changes from the recommended practices Yes ☐ No ☐

2. If yes, what were they and why did they occur?

3. After the crop was planted, did any pest damage it? Yes ☐ No ☐

| Type of pest | Date | Type of damage | Degree of damage |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

4. Were there any problems from grazing animals, theft by human, monkeys, Yes ☐ No ☐

5. If yes, what were they? How could they be prevented?

6. Was there any bad weather like strong winds, hail, drought, heavy rain or floods, etc? Yes ☐ No ☐

7. If yes, explain (Date, type of extent of damage)

8. How much rainfall occured during the time the crop was in the field?

| | month | mm |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

n

9. What price could the farmers receive for their products at the time of harvest ?

| | Crop | Variety | Price/kg |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

10. Did you have any farmers field day in which you showed this PPVT to the farmers ? Yes ☐ No ☐

If Yes,

| Dates | Number of farmers attending |
|---|---|
| | |
| | |
| | |

11. Did any of the farmers want to obtain the seed ? Yes ☐ No ☐

If yes, how many farmers ?

12. What were the farmer's comments about the trials ?

_____

_____

_____

## DETAILED OUTLINE OF PVT METHODOLOGY TRAINING PROGRAM

10:30 - 12:00 (Day 1) I. INTRODUCTION

i) Introductory remarks by ADO
ii) Review of objectives:
- train ADOs and JT/A's on how to conduct PVT's
- review findings of first site visit/selection of wards
iii) Importance of Cropping Systems Program in Nepal and it's role in extension:
- brief history of the program
- flow of technology from research to farmer's fields
- extent of PVT's in Nepal
iv) Benchmark evaluation of the trainees
v) Review of benchmark evaluation, with explanation of frequently used terminology in Cropping Systems:
- Relay, mixed, intercropping
- Component technology
- Cropping pattern
- Land type
- Etc.

13:00 - 16:15 II. PRE-PRODUCTION VERIFICATION TRIALS

A. Discussion of PVT's:

i) What are they?
ii) Why conduct them?
iii) Can they be used as result demonstrations?
iv) Are they an additional work load?

- developing agricultural technology for a particular Panchayat
- the next step is a production program
- handling small problems with PVT's can help prevent large problems in a production program
- introduction of improved varieties of seed and recommended rates of artificial fertilizer
- develop information on cropping practices in Nepal
- work in farmers' fields with farmer's participation, comparing improved with local practices

v) How should you explain PVT's to farmers?

- We learn and the farmers learn; we teach and the farmers teach

B. How do you start PVT's:

i) and ii) Selection of specific location and site description report;

Contd.../...

- first visit by ADO, Agronomist, Socio-Economist, JT/A, Field Assistants
- select several wards of the Panchayat
- meet with farmers and Pradhan Pancha
- collect information on main cropping patterns, varieties grown, extent of improved technology practices, water availability, land types, yields, chemical fertilizer and compost application, seed rates, climatic data and general impression of AIC and ADB involvement in the site wards
- review the findings of this data collection; hand-out completed data summary sheets
- selection of cropping patterns based on which are already predominant.

iii) Selection of farmers and parcels

- five for each trial - 5 replications per pattern
- should be as typical as possible
- farmers must agree to cooperate
- advantages of selecting a farmer who traditionally sells some of his seed and grain

---

10:00 - 11:30 (Day 2)

C. Design of FVT's:

i) Size of plot should be near to 1000 $m^2$, and no less than 500 $m^2$:

- helps convince farmers better than a small plot
- better for field days and displaying the results to influence farmers, extension workers and administrators
- good seed multiplication plot
- easier to manage by farmers

ii) Land measurement:

- $\text{AREA} = \frac{(L_1 + L_2 + L_3)}{3} \times \frac{(W_1 + W_2 + W_3)}{3} = m^2$
- hills vrs. terai

iii) Comparing local with recommended practices:

- preferably on the same plot, occupying about 20% of the 1000 $m^2$
- to determine difference between practices, and be more reliable in the estimates
- all crops in the pattern should be grown on the same plot, and the local practices should continue in the same area.
- one or two years needed - for stability?
- if more than one variety per trial, varieties should be grown on same plot and planted at the same time.

Contd.../...

iv) Importance of clustering:

- less research and extension personnel needed
- precision in one area is increased
- supervision is easier
- more locations can be handled in the general area
- to spread the technology, JT/A's can conduct demonstration plots in other areas

11:30 - 16:30 D. Management of PVT's:

i) Seed sampling and germination testing

- handout will be given
- % germination $= \frac{\text{Total \# germinated}}{\text{\# of seeds}} \times 100$
- $\frac{\text{Recommended seed rate}}{100} \times \frac{\text{\% below}}{85\%} = \text{Adjusted seed rate}$

ii) Supervisions:

- whose responsibility
- how frequent
- timely planting, fertilizer application, crop harvesting, pest control and data collection essential

iii) Yield sampling:

- when to arrange with farmer
- area to sample : rice and wheat - 10 $m^2$; maize - 20 $m^2$; etc.
- random sample necessary
- moisture content; sun drying

iv) Farmer's field days and exchange of seed:

- demonstration effect
- opportunity to teach and learn from farmers
- opportunity to buy or barter new seed

v) Seed distribution:

- JT/A should encourage farmers to distribute seed to other farmers; very difficult to get good seed of new improved varieties

vi) Seed storage methods:

- very important to completely dry the seed
- clean separate room and containers
- insecticide use
- keep insects and rodents out
- 2 weeks before planting, take germination sample

Contd.../...

Morning of Day 3

III. FIELD VISIT TO POSSIBLE PVT SITE

- practice explaining PVT process between JT/A and farmers

13:00 - 13:45

IV. FINAL EVALUATION OF TRAINEES

- including trainee's assessment of the training

14:00 - 16:30

V. DEVELOPING PRELIMINARY WORK PLAN FOR PVT'S

i) Application of site specific technology:

- which cropping pattern, variety and amount of fertilizer to use, etc.
- determining rates

$$\frac{\text{Dose}}{\text{Fert. content}} \times \frac{\text{Area } m^2}{100} = \text{kg's of urea or complesal}$$