PN-AE-080
64299

REPORT ON DEVELOPMENTAL INVESTIGATION

CTTA - PERU

Shakir Hussein, Ph.D.
Research Associate (ACT)

Martha Cruz
Evaluation Field Director (ACT)

José Ignacio Mata
Project Director (AED)

March, 1988

Applied Communication Technology
1010 Doyle Street, Suite 17
Menlo Park, California 94025
(415) 322-6466

The Communication for Technology Transfer in Agriculture (CTTA) Project is jointly managed and funded by the Offices of Education, Agriculture, and Rural Development of the Bureau for Science and Technology of the United States Agency for International Development in collaboration with Regional Bureau Technical Staff and the USAID Mission at each collaborating site. Technical services are provided by the Academy for Educational Development under Contract No. DPE-5826-C-00-5054-00. ACT is contracted by the Academy for Educational Development to conduct summative evaluation of the CTTA Project in all countries.

TABLE OF CONTENTS

CHAPTER I

A. INTRODUCTION 1

1. The CTTA Project 1
2. What is Developmental Investigation? 2
3. Conducting the Developmental Investigation 3

B. BACKGROUND INFORMATION 3

1. Location of Data Collection 3
2. Sampling 4
3. Processing of Data 4

C. STRUCTURE OF THE REPORT 4

D. ACKNOWLEDGEMENTS 5

CHAPTER II

SUMMARY OF FINDINGS AND IMPLICATIONS FOR THE COMMUNICATION STRATEGY 6

A. SOCIO-ECONOMIC CHARACTERISTICS OF THE TARGET AUDIENCE 6

B. THE CALENDAR OF AGRICULTURAL ACTIVITIES 7

C. USE OF AGRICULTURAL TECHNOLOGY 8

1. Sowing 8
2. Weed Control and Hilling 8
3. Fertilizing 9
4. Plant Protection 10

D. INSTITUTIONAL SUPPORT 11

1. Technical Assistance 11
2. Credit 12

E. USE OF RADIO 12

F. OTHER COMMUNICATION CHANNELS 13

CHAPTER III

SOCIO-ECONOMIC CHARACTERISTICS OF TARGET AUDIENCE 14

A. AGE 14

B. FAMILY SIZE 14
C. LEVEL OF SCHOOLING AND FAMILY LITERACY 14
D. LAND TENURE 16
E. CROPS CULTIVATED 17
F. CROP-HECTARES CULTIVATED 17
G. AVAILABILITY OF IRRIGATION 19

CHAPTER IV

CALENDAR OF AGRICULTURAL ACTIVITIES 20

A. POTATO 20

1. Sowing 20
2. Weed Control 20
3. Hilling 23
4. Fertilizing 23

B. CORN 23

1. Sowing 23
2. Weed Control 24
3. Hilling 24
4. Fertilizing 24

C. WHEAT 24

1. Sowing 24
2. Weed Control 24
3. Hilling 27
4. Fertilizing 27

D. MONTHLY INTENSITY OF LABOR DEMANDS 27

CHAPTER V

AGRICULTURAL TECHNOLOGY USED BY FARMERS 29

A. SOWING 29

1. Seedrate 29
2. Seed Sources 32
3. Use of Selected Seeds 34
4. Reasons for not Using Selected Seeds 35

B. FERTILIZING 36

1. Types of Fertilizers Used 36

C. PLANT PROTECTION 39

1. Salience of Pests and Diseases 39

2. Use of Pesticides 39
3. Types of Pesticides Used 40
4. Reasons for not using Pesticides 42

CHAPTER VI

INSTITUTIONAL SUPPORT 44

A. TECHNICAL ASSISTANCE 44

1. Receipt of Technical Assistance and Sources of Technical Assistance 44
2. Types of Technical Assistance Received 44
3. When Was Technical Assistance Last Received? 44
4. Farmers' Perception of Utility of Technical Assistance 45
5. Reasons for not Receiving Technical Assistance 45
6. Where Would Farmers Seed Advice? 45
7. Who Could Provide The Best Agricultural Advice? 46

B. USE OF CREDIT 47

CHAPTER VII

USE OF RADIO 48

A. RADIO AUDIENCE 48
B. REASONS FOR FARMER PREFERENCE FOR RADIO STATIONS 48
C. POPULAR LISTENING TIME 50
D. PREFERRED TIMES FOR AGRICULTURAL PROGRAMS 50
E. SUGGESTIONS FOR IMPROVING AGRICULTURAL RADIO PROGRAMS 51
F. RADIO LISTENING VERSUS USE OF AGRICULTURAL TECHNOLOGY 52

CHAPTER VIII

CONCLUSION 53

APPENDIX I PESTS AND DISEASES OF CROPS IN PERU 56

APPENDIX II QUESTIONNAIRE 57

CHAPTER I

INTRODUCTION

A. INTRODUCTION

1. The CTTA Project

This report is based on the developmental investigation data collected at the CTTA Project site in Peru. The CTTA (Communication For Technology Transfer in Agriculture) Project is an innovative communication project financed by United States Agency for International Development. It is being implemented in Peru and other selected developing countries by their Governments with technical assistance from the Academy for Educational Development.

The CTTA Project "provides an opportunity to apply innovative approaches for effective use of communication to support agricultural extension programs in pilot communication projects in up to nine developing countries. The project objective is to develop, test, and demonstrate integrated multi-channel communication strategies and methods that increase the impact of extension type programs at costs affordable for sustained use by developing nations."[1]

The communication process followed by CTTA consists of the following 9 stages, one of which is the basis of this report:

a. Developmental Investigation

b. Design of the strategy and materials

c. Testing the strategy concept and materials

d. Materials production

e. Delivery

f. Audience reception

g. Formative evaluation

---

[1] Ray, Howard E., "Implementing Communications In Development Projects: New Directions." Paper presented at conference on "Agricultural Development: Systems and Communication," Association of U.S. University Directors of International Agricultural Programs and Agricultural Communicators in Education, Galilee, Rhode Island, June 1 - 4, 1987.

h. Summative evaluation

i. Ongoing monitoring.

Training and support are also ongoing and concurrent functions carried out by the CTTA Project.

2. <u>What is Developmental Investigation?</u>

Developmental investigation is a rapid evaluation of the context in which the project is to be implemented. In the CTTA Project it performs three functions[2].

a. Firstly, it determines the stages of readiness for diffusion of new and underutilized agricultural technologies. The potentially appropriate technologies are then assessed from farmers' perspectives with respect to: perceived dependability, economic feasibility, compatibility (similarity to present practices), practicality considering farmers resources and other constraints, and possible negative consequences of non adoption.

b. Secondly, the developmental investigation determines the following characteristics of the audience:

   i. Cultural and socioeconomic

   ii. Vocabulary

   iii. Receptivity to change

   iv. Ways of receiving and using new information

   v. Practices and adoption levels

   vi. Hidden constraints they may encounter in trying an innovation.

c. Thirdly, developmental investigation assesses the agricultural infrastructure and policies which will have an impact on the adoption of technologies under consideration. The practicality of a given technology depends in part on farmers' access to credit, inputs, markets and their receipt of good prices for their produce.

   The existing practices and policies governing the availability of these services may serve as incentives

---

[2] Taken from the CTTA Project Manual.

or disincentives, and this must be taken into consideration in determining the communication strategy.

3. Conducting the Developmental Investigation

The main objective of a developmental investigation is to quickly provide the planners and implementors of the project in each country with the type of information listed above so that informed planning and educated decisions can be made. Therefore, alacrity takes precedence over statistical rigor, but that is not to say that principles of good data collection should be disregarded. Data collection may be conducted using any of the following methods: focus groups; informant surveys; extensive visits and discussions with farmers, policy makers, and providers of support services; and even surveys using structured questionnaires. The best approach may be a combination of two or more of the above.

The use of surveys with structured questionnaires is becoming more attractive as one of the main methods in determining audience characteristics simply because of the increasing availability of micro-computers and statistical packages for them in developing countries. Results of survey data can be obtained from one to four weeks after completion of data collection. The added attraction of using surveys, especially for relatively large populations, is the potentially greater correspondence between the audience's true characteristics and the survey results as opposed to similar correspondence obtainable by anthropological methods alone.

B. BACKGROUND INFORMATION

The quantitative data formally reported herein were collected in Peru during February, 1987, by the CTTA Director in that country with assistance from ACT's Evaluation Field Director who was also located in Peru. The design of the survey and the development of the data collection instrument were their responsibilities. It should be pointed out that complementary qualitative data were also collected (not included in this report) from farmers, researchers, and extension agents by means of focus groups, intensive interviews, and participatory activities. The reader should keep this in mind whenever he/she encounters information gaps in the report.

1. Location of Data Collection

The data were collected in the sector of Marcara located in the Agency of Carhuaz. Carhuaz is located in the Department of

Ancash[3]. The Department of Ancash is located 400 kilometers from Lima in the Callejon de Huaylas, a valley located in the Andes between the two mountain ranges, Cordillera Blanca and Cordillera Negra.

Marcara is the first site of the CTTA Project and it consists of 5 communities: Copa Chico, Recuayhuanca, Siete Imperios, Shumay, and Vicos. Data were collected from all five communities

2. Sampling

No rigorous sampling procedure was used mostly because it was not warranted and because the information on farmers' names and addresses was not available at that stage, and it would have required too much time to compile a sampling frame. In each of the communities the interviewers traversed all the roads, and non-systematically selected farmers for interviewing. Availability of respondents was an important factor. Thus it should be kept in mind for an interpretation of the following data that the figures are not necessarily representative of all farmers in Ancash, but of those farmers who were easily available for interview in Marcara. 252 farmers were interviewed in this way using a structured questionnaire.

3. Processing of Data

The coding of responses and entry of data to codeforms were done in Peru. ACT's Home Office did the processing in March, 1987, and the results, made available to the Project Director in April, 1987, were not formally reported previously.

C. STRUCTURE OF THE REPORT

A summary of the results and brief discussion of their implications for the communication strategy are presented in Chapter II, and more details of the data are presented in Chapters III - VII. Chapter III deals with the socioeconomic characteristics of the farmers; Chapter IV determines the cropping cycles of the main crops cultivated and also the relative combined labor demands for each calendar month; Chapter V presents farmers' levels of technology use; Chapter VI determines farmers' participation in support services; Chapter VII assesses the extent to which radio as a communication channel

---

[3] For purposes of agricultural administration, Peru is divided into several Departments, which are subdivided into Agencies. The Agencies are further subdivided into Sectors and each Sectors may comprise of one or more Communities.

was being used and determines its potential for communicating agricultural technology.

D. ACKNOWLEDGEMENTS

ACT wishes to thank the United States Agency for International Development, especially the Offices of Education, Agriculture, and Rural Development of the Bureau for Science and Technology and their Mission in Lima, Peru. Without their financing, the CTTA project would not have been possible. We express special thanks to Dr. Timothy Miller of AID Mission in Peru who was extremely helpful and cooperative. ACT also acknowledges the invaluable support of AED in Washington provided by Dr. Howard Ray and Mr. Edwin Tout of CTTA's Home Office. In addition, ACT is also thankful for the excellent cooperation received from the staff of the Office of Technical Communication of INIPA (The National Institute of Agricultural Research and Extension) in Lima and Huaraz, Peru. Of special mention are Mr. Arguelles, Director of OCT in Lima, and Mr. Ramon Espinoza, Director of OCT in Huaraz.

CHAPTER II

SUMMARY OF FINDINGS AND IMPLICATIONS FOR THE COMMUNICATION STRATEGY

Developmental investigation data guide the development of the communication strategy in the CTTA Project. The more complete and comprehensive the available data, the greater their use in the planning and development of a strategy that is appropriate to the needs, problems, and circumstances of the target audience. However, depending on the limitations to data collection and analysis, developmental investigation data may not be as exhaustive as a baseline study. In fact, it should not be. The degree of completeness and comprehensiveness needed for planning and development of a strategy is often decided by the Project Director. This decision takes into consideration data that are already available from other sources. The data reported herein reflect only the quantitative data collected. Qualitative data were also collected by anthropological methods.

The data collected in this developmental investigation provide information on the socioeconomic characteristics of the target audience, their calendar of agricultural activities, their use of agricultural technology, their participation in supporting institutions, and their use of radio.

A. SOCIOECONOMIC CHARACTERISTICS OF THE TARGET AUDIENCE

The data indicate that the majority of the farmers (71 %) were 45 and less years of age. The mean and median ages were 40 and 38 years respectively. For a developing country it can be said that the majority of farmers were relatively young. Because younger farmers are generally more receptive to technological changes than older farmers, the communication of appropriate messages to the relatively young audience in Peru has a good chance of being successful. Another encouraging factor, from the communicator's point of view, was the very high rate of household literacy in the area. About 88 % of the farmers' households had at least one person who could read. This augurs well for the use of written materials.

The farming population also consisted of about 19 % of female farmers. The planners and implementors of the communication strategy would need to understand the relevant aspects of the culture that could affect successful communication with female farmers.

Most farmers (92 %) cultivated more than one of the following main crops: potato, corn, and wheat; and 48 % cultivated all three crops. The implication herein for a communication strategy is that most farmers would need

information and technical assistance on more than one technology at any particular time especially if these crops are grown simultaneously or slightly staggered.

The sowing period for each crop extended for several months with considerable overlap. One influential factor was the availability of irrigation to 85 % of the farms throughout the cropping year.

For any one crop (potato, corn, or wheat) the majority of farmers cultivated small areas of 0.5 ha. or less. In fact this was the case for 76 % of the potato farmers, 83 % of the corn farmers, and 89 % of the wheat farmers. Because most farmers cultivated more than one of these crops, and a few cultivated one or more of them twice in the same year, the distribution of the cumulative area (crop-hectare) cultivated by most farmers was somewhat different. The cumulative crop-hectare was 0.5 or less for 45 % of the farmers. This is substantially less than similar percentages for area cultivated with individual crops. Nevertheless, it can still be said that the majority of farmers were small farmers. This would have implications for the communication strategy since the perceived risk in utilizing new technologies is greater for smaller farmers than for larger farmers. Also, their access to credit would be correspondingly reduced with progressively smaller plots especially since the lending institutions did not provide agricultural loans to farmers with less than one hectare. Correspondingly, the challenge for a technology transfer strategy would be greater.

B. THE CALENDAR OF AGRICULTURAL ACTIVITIES

A calendar of agricultural activities provides useful information on the timing of agricultural operations during the cultivation of a crop. Three calendars of activities have been prepared from the data: one each for potato, corn, and wheat. These calendars show timing of: sowing, weed control, hilling, first fertilizing, second fertilizing, and harvesting. They also show the percentages of farmers that performed each of these operations during each month of the cropping year. This information is useful in planning the timing of communication. In order to determine the intensity of activities for each month, a fourth calendar was prepared in which the activities of all three crops were combined. This calendar indicates the periods of intense activities and periods of little activity. This information is useful in guiding the appropriate timing of several other types of activities, such as data collection, farmer training courses, etc.

C. USE OF AGRICULTURAL TECHNOLOGY

With respect to use of agricultural technology, quantitative data were collected on sowing, fertilizing, and plant protection.

1. Sowing

The data indicate that the majority of farmers were using incorrect seed rates. In the case of potato, for at least 63 % of the planting instances[4] lower seed rates than those recommended were used. In the case of corn, lower and higher seed rates than the one recommended were used for 24 % and 68 % of the corn planting instances respectively. In the case of wheat, lower and higher seed rates than the one recommended were used in 55 % and 26 % of the wheat planting instances respectively. These statistics signify a great need for correcting seed rates in order to establish optimum plant densities. Plant density is an important factor in determining productivity of a crop.

The data also indicate that the majority of farmers were using their own seeds. This was the case for 69 % of the potato planting instances, 88 % of the corn planting instances, and 90 % of the wheat planting instances. Only 4 % of the farmers used seeds from certified seed producers. Because there were indications of severe disease infestations on all the crops, use of own seeds implies use of unhealthy seeds unless farmers were skilled in the production of seeds. The implication herein for a communication strategy is the need for educating farmers on the production of good quality seeds. Purchasing of seeds from certified seed producers for each planting instance would be too expensive a practice for small farmers.

Farmers also indicated their reasons for not using 'selected' seeds. Of those who did not use selected seeds, 51 % lacked funds, and 24 % lacked the relevant knowledge.

2. Weed Control and Hilling

Weed control was not commonly practiced as a separate and individual activity in the cultivation of potato and corn. It was mostly combined with hilling. As a result, only 36 % of the potato farmers and 35 % of the corn farmers said they carried out weed control. On the other hand, more than 96 % of the potato farmers and 98 % of the corn farmers practiced hilling.

---

[4] Planting instance is used in this report to mean each time a crop was planted. As a result, the number of planting instances is larger than the number of farmers. If one farmer planted one crop twice, this represented two planting instances but only one farmer.

This situation was reversed for wheat. Hilling is not a common activity in the cultivation of wheat and therefore weed control and hilling are not normally combined. Only 18 % of the wheat farmers said they practiced hilling, but 97 % practiced weed control.

The timing of these activities is also critical. However, the data collected could not be used for a reasonable determination of the timing relative to the dates of sowing. This information was not considered necessary at the time of data collection.

Farmers apparently were conscious of the advantages of weed control and hilling and therefore expended much labor on these operations. Although these activities did not require any expenditure of funds (assuming that the farmers and their families provided the labor), one may predict that these farmers would be similarly enthusiastic in embracing innovative compatible agricultural technologies if they are convinced that these technologies have desirable advantages and are provided with the means to use them.

3. Fertilizing

The use of fertilizers was a common practice of the majority of farmers. Fertilizers were applied on 96 % of the potato plantings[5], 97 % of the corn plantings, and 82 % of the wheat plantings. However, although two applications of fertilizers were recommended for potato, corn, and wheat, most farmers practiced one application. Two applications were made by less than 15 % of the potato farmers, by 2.4 % of the corn farmers, and by 1 % of the wheat farmers. Timing of fertilizing is also critical. However, the data could not be used to determine the timing used by farmers relative to the dates of sowing. Quantities of fertilizers applied is also critical, but no data was collected on this aspect.

With respect to the types of fertilizers applied, the data indicate that farmers used 18 different combinations consisting of one or more of the following: nitrogen fertilizer, phosphorous fertilizer, potassium fertilizer, organic fertilizer, and 12:12:12 (a mixed fertilizer). 13 of these combinations were used for potato, 11 for corn, and 8 for wheat. Since there was only one fertilizer recommendation for each crop, these statistics may be indicating great uncertainty or lack of knowledge among farmers on the correct types of fertilizers needed.

---

[5] Planting is used to mean a crop planted at each planting instance. It is not equivalent to area cultivated.

Another common fertilizing malpractice that was found is the wide use of nitrogen fertilizer alone. The use of organic fertilizer was also minimal.

With respect to fertilizing, the implications for the communication strategy are numerous. Education is needed on the importance of: split applications, correct quantities, appropriate timing, and correct mixtures that would provide the required elements. The use of organic fertilizers should also be promoted. Organic fertilizers not only contain most of the elements needed, but they also enhance the soil structure and reduce soil destruction.

4. Plant Protection

Data were not collected on incidence of pests and diseases, instead farmers were asked what they felt were the most important problems. Feelings may or may not corresponded closely to incidence. With respect to the most important problems of potato, 94 % of the potato farmers mentioned Rancha[6], 61 % Papakuru, and 44 % Tocto. For corn, 89 % of the corn farmers mentioned corn ear worm. For wheat, 73 % of the wheat farmers mentioned Polvillo, and 38 % Rust. These statistics indicate that all three crops were felt to have extensive pest and disease problems, and consequently. This makes a strong case for the promotion of pests and diseases prevention and control programs.

The data also indicate that 55 % of all farmers had used pesticides. However, data were not available to determine whether they matched pesticides with pests/diseases correctly. Also no data was collected on rates of application, nor whether farmers could identify problems caused by insects, fungus, virus, bacteria, or nematodes. These were not considered important for inclusion in the developmental investigation.

The data did indicate that farmers applied 23 different types of pesticides. This statistic may be indicating farmers' great uncertainty or lack of knowledge on the types of pesticides needed to combat the problems they experienced.

With respect to plant protection, the implications for the communication strategy are also numerous. To combat the damage caused by the numerous pests and diseases on potato, corn, and wheat, prevention should be advocated. Prevention would cost much less than control. Farmers should also be trained to identify the various pests and disease problems and to match pesticides with the problems. Farmers should also recognize that

---

6 For english translations of all pests and diseases see Appendix I

timing of applications and the quantities applied are critical for achieving good results.

D. INSTITUTIONAL SUPPORT

Data were collected on technical assistance and credit.

1. Technical Assistance

20 % of all farmers indicated that they received technical assistance. Of these, 49 % did so from Government technical institutions (Research and Extension). In terms of the whole sample, these technical institutions provided technical assistance to only 10 % of the farmers.

Most of the technical assistance received was categorized as 'visits'. 78 % of the recipients of technical assistance received this form. However, because visits were distinguished from agricultural advice, the purpose of the visits remain uncertain. Agricultural advice was received by 41 % of the recipients. This translated into 8 % of all farmers.

Most of those who received technical assistance did so more than two years prior to the date of data collection. This was the case for 63 % of the recipients. Also, 24 % of this 63 % did so more than 4 years prior to the data collection. Only 37 % of the recipients received technical assistance within one year prior to the data collection.

The reasons mostly cited by non-recipients for not receiving technical assistance were: the technical officers simply did not visit them (70 %); they did not know where to obtain technical assistance (15 %).

Farmers also indicated where they would seek advice should they have a problem. Only 26 % would seek advice from the technical institutions. 33 % would seek the needed advice from family, friends, and neighbors, and a small percentage from sellers of agricultural inputs (13 %).

It is encouraging that 92 % of the farmers believed that receipt of technical assistance would assist them to improve their cultivation.

All the above statistics seem to indicate that unfamiliarity with the available technical services was the most serious problem. A communication strategy can achieve much by simply increasing the visibility of its technical officers, and by educating farmers on the technical services available and how to make use of them.

2. Credit

Only 24 % of all farmers used credit some time or the other in the past. Most of these farmers (92 %) used credit for some aspects of their potato cultivation. Also 23 % used it for corn, and 16 % for wheat.

The more important reasons for not using credit were: fear of risks, or more specifically fear of inability to repay (52 %); lack of knowledge of procedures and requirements (39 %); and possession of too little land (29 %).

A communication strategy can concentrate on influencing the policy that determines the accessibility of credit to small farmers, and also on educating farmers on the procedures and requirements for obtaining credit.

E. USE OF RADIO

Encouragingly, 85 % of all farmers were listening to radio. This augurs well for a communication strategy that also employs radio for the dissemination of technical information. Farmers also indicated their preferred radio stations and preferred listening time. Radio Ancash was the most preferred radio station with 84 % of the farmers in its audience. Most farmers were listening to radio in the mornings between 4 a.m. and 7 a.m. The single hour with the largest audience (41 %) was 5 a.m. - 6 a.m. There was also a substantial audience in the evening from 5 p.m. to 7 p.m.

Farmers' preference for the radio stations of their choice was based on the news program (66 %), music (48 %), and the use of Quechua language (28 %). The programs they listened to corresponded with their preferences, and the times they preferred for agricultural programs corresponded with their listening habits. That is, most farmers would prefer mornings especially during 5 a.m. to 6 a.m. (44 %), and 6 a.m. to 7 a.m. (29 %).

They also provided the following valuable suggestions for improving the agricultural radio programs: expand it (42.5 %); provide more explanations (9.5 %); speak in Quechua (36.5 %); provide more agricultural advice (38.5 %); provide more information on pests and diseases and on livestock (25.4 %); and include more music (6.3 %).

Great promise in the use of radio is evident in the large radio audiences consisting of farmers who used and who did not use technology and support services. 86 to 91 % of those who used technology and support services were listening to radio, and 70 to 83 % of those who did not use technology and support services were also listening to radio. It is clearly evident

that radio properly employed can reach the majority of the farmers.

F. OTHER COMMUNICATION CHANNELS

Data on indigenous communication channels were collected by qualitative methods. These would be usefully incorporated in the multi-channel communication strategy.

CHAPTER III

SOCIOECONOMIC CHARACTERISTICS OF FARMERS

Information on age, level of schooling, family literacy, family size, land tenure, crops cultivated, areas cultivated, and availability of irrigation are presented in this chapter.

A. AGE

The majority of farmers (71.1 %) were under 46 years of age. In this category there were 69.4 % of the male farmers and 77.6 % of the female farmers (Table 1). There was no significant difference in the distribution of male and female ages, i.e., the percentages of male and female farmers under 46 years of age were not statistically different. The mean and median ages for all farmers were 40 and 38 years respectively. For a developing country the majority of farmers were relatively young.

TABLE I: Distribution of Farmers' Ages by Sex

Age (Years)	% Male Farmers	% Female Farmers	% All Farmers
16-25	10.3	18.4	11.9
26-35	27.6	38.8	29.8
36-45	31.5	20.4	29.4
46-55	17.2	10.2	15.9
56-65	8.9	8.2	8.7
>65	4.4	2.0	4.0
no information	-	2.0	.4
	100.0 (N=203)	100.0 (N=49)	100.0 (N=252)

B. FAMILY SIZE

The majority of farmers had families with 5 or more members including themselves. This category included 69.1 % of all farmers with no significant difference in the distribution of male and female farmers in the sample (Table 2). The mean and median family sizes were 5 and 5 respectively.

C. LEVEL OF SCHOOLING AND FAMILY LITERACY

Thirty four percent of male farmers and 46.9 % of female farmers did not attend school. In the total sample this

TABLE 2: Distribution of Farmers' Family Size By Sex of Farmers

Size of Family	% Male Farmers	% Female Farmers	% All Farmers
1-2	6.9	0.0	5.6
3-4	22.2	38.8	25.4
5-6	43.3	32.7	41.3
7-8	21.7	24.5	22.2
>8	5.9	4.0	5.6
	100.0 (N=203)	100.0 (N=49)	100.0 (N=252)

TABLE 3: Distribution of Farmers' Levels of Schooling by Sex

Level of Schooling	% Male Farmers	% Female Farmers	% All Farmers
None	34.0	46.9	36.5
Primary	59.1	49.0	57.1
Secondary	6.9	4.1	6.3
	100.0 (N=203)	100.0 (N=49)	100.0 (N=252)

TABLE 4: Distribution of Family Literacy by Sex of Farmers

No. of literate family members	% Male Farmers	% Female Farmers	% All Farmers
0	12.3	12.2	12.3
1-2	50.2	59.2	52.0
3-4	25.1	18.4	23.8
5-6	7.9	4.1	7.1
7-8	2.5	6.1	3.2
>8	2.0	0.0	1.6
	100.0 (N=203)	100.0 (N=49)	100.0 (N=252)

represents 36.5 % of all farmers (Table 3). Although this was a relatively high level of non-schooling, the family literacy rate was high. 87.7 % of all farmers' households had one or more members who could read (Table 4).

D. LAND TENURE

The majority of farmers (60.7 %) were cultivating communal land (Table 5). Although local administration of these communities was the responsibility a community council, farmers had control of their individual parcels and individually decided the use of their land and the agricultural technologies employed.

TABLE 5: Distribution of Types of Land Tenure

Type of Land Tenure	% Farmers
Communal	60.7
Individual	29.8
Rented	2.0
Communal + Individual	7.1
Individual + Rented	0.4
	100.0 (N=252)

TABLE 6: Distribution of Farmers By Crops Cultivated

Crops Cultivated	% Farmers
Potato + Corn + Wheat	48.4
Potato + Corn	17.5
Potato + Wheat	10.7
Corn + Wheat	15.5
Potato Only	2.4
Corn Only	3.6
Wheat Only	2.0
	100.0 (N=252)

E. CROPS CULTIVATED

Three main crops (potato, corn, and wheat) and one minor crop (barley) were cultivated by farmers. This report is based on the main crops. Most farmers cultivated a combination of the main crops but a very small percentage cultivated single crops (Table 6). 48.4 % of all farmers cultivated all three of the main crops, 43.7 % cultivated only two of the three main crops, and 8.0 % cultivated only one. The type of agriculture practiced by most farmers was therefore multi-culture. As a result, most farmers would require various types of technical assistance for their farm at any particular time during the cropping year.

Processing of the data also yielded the number of farmers that cultivated each of the main crops whether in combination with other crops or not. Because many farmers cultivated more than one crop, the total percentage exceeds 100. The total number and percentage of farmers that cultivated each of the main crops are given below:

Total farmers who cultivated potato	= 198 (78.6%)
Total farmers who cultivated corn	= 214 (84.9%)
Total farmers who cultivated wheat	= 194 (77.0%)
	(N=252)

F. CROP-HECTARES CULTIVATED

Farmers were asked how much land they cultivated for each crop they planted. If a farmer did not know, or was very uncertain, or for some other reason was unable to provide a figure, the interviewer calculated the area cultivated based on the amount of seeds the farmer said he used for the said crop. There are several problems with such a determination of cultivated land, and therefore, the figures reported here should be interpreted cautiously.

The area cultivated by farmers for each of the three main crops are presented in table 7. The majority of farmers were cultivating 0.5 hectare or less. In fact this category included 76.3 % of the potato farmers, 83.7 % of the corn farmers, and 88.6 % of the wheat farmers. But more than one-third of the potato and corn farmers, and more than half of the wheat farmers were cultivating 0.2 hectare or lees. The mean and median sizes of the areas cultivated for each crop were: potato, 0.4 and 0.2 ha; corn, 0.4 and 0.25 ha; wheat, 0.25 and 0.1; respectively.

Data were not collected for amount of farm land owned, nor for amount of farm land over which each farmer had control. It

was therefore not possible to determine the actual sizes of farms owned or operated by farmers. However, a substitute measure -

TABLE 7: Area Cultivated By Farmers By Crops

Area (Hectare)	CROPS		
	Potato % Farmers	Corn % Farmers	Wheat % Farmers
≤ 0.10	27.8	30.4	43.8
0.11 - 0.20	11.6	9.3	10.3
0.21 - 0.30	16.2	19.2	11.3
0.31 - 0.40	0.5	2.8	0.5
0.41 - 0.50	20.2	22.0	22.7
0.51 - 1.00	16.2	12.1	8.2
1.01 - 2.00	6.1	2.8	3.1
2.01 - 3.00	1.0	0.9	-
3.01 - 4.00	0.5	-	-
> 4.00	-	0.5	-
	100.0 (N=198)	100.0 (N=214)	100.0 (N=194)

TABLE 8: Crop-Hectares Cultivated by Farmers (Sum of area cultivated for all crops)

Area (Crop-ha.)	% Farmers
< 0.1	12.7
0.11 - 0.20	8.7
0.21 - 0.30	7.5
0.31 - 0.40	8.7
0.41 - 0.50	7.5
0.51 - 1.00	21.4
1.01 - 2.00	21.0
2.01 - 3.00	6.3
3.01 - 4.00	3.2
> 4.00	2.8
	100.0 (N=252)

crop-hectare - (i.e., the cumulative area cultivated by a farmer during one crop year) was used to determine relative size of

areas cultivated. This measure indicates that: 21.4 % of the farmers were cultivating 0.2 crop-hectare or less; 45.1 % were cultivating 0.5 or less; 21.4 % between 0.5 and 1.00; and the remaining 33.3 % more than 1.00 (Table 8). The mean and median areas cultivated were 1.02 and 0.6 crop-hectare respectively.

G. AVAILABILITY OF IRRIGATION

Irrigation was available to 85.3 % of the farms. 60.7 % of the farmers had totally irrigated farms, and only 14.3 % had no irrigation (Table 9). This abundance of irrigation was due to the location of the farms. All farms were located on the eastern side of the valley which was fed continuously by water originating from the melting snow on the peak of the Cordillera Blanca.

TABLE 9: Distribution of Irrigated and Non-irrigated Farms

Type of Farms	% Farmers
Irrigated only	60.7
Irrigated + Non-irrigated	24.6
Non-irrigated only	14.3
No information	0.4
	100.0 (N=252)

CHAPTER IV

CALENDAR OF AGRICULTURAL ACTIVITIES

Basically, a calendar of activities indicates when the activities are performed, the intensity of each activity, and the total intensity of all activities for each time interval. The calendars of agricultural activities prepared in this chapter strive to provide similar information.

Data were collected on the months in which farmers carried out the following agricultural operations for each crop: sowing, weed control, hilling, first fertilizing, second fertilizing, and harvesting. The calendars of activities therefore include only these activities. No data was collected on timing of land preparation, nor on pest and disease prevention and control. One calendar each was prepared for corn and wheat. Because potato has two distinct planting seasons, two calendars were prepared for this crop.

A. POTATO

1. Sowing

There were basically two potato planting seasons called Papa Chica and Papa Grande:

a. Papa Chica is a smaller season extending from January to June with concentration of sowing in the period April - June (Table 10 and Figure 1). In Papa Chica 21 % of all potato farmers sowed potatoes, i.e., 42 of 198 potato farmers.

b. Papa Grande is the larger season extending from July to December with concentration of sowing in the period August - October (Table 11 and Figure 2). In Papa Grande 82.8 % of all potato farmers sowed potatoes, i.e., 164 of 198 potato farmers.

2. Weed Control

Weed control as a separate activity was performed by only 36 % of Papa Chica and 36 % of Papa Grande farmers. However, this does not mean that weed control was not practiced by the other farmers since weeds were normally removed during the hilling process.

The timing of weed control activity relative to the date of sowing cannot be determined exactly since data were collected on the months in which this activity was performed and not on the number of days after sowing. The months in which the crop was

TABLE 10: Calendar of Agricultural Activities Performed By Potato Farmers (papa chica)

Activity	Sowing	Weed Control	Hilling	First Fert.	Second Fert.	Harvesting
Month	%Farmers	%Farmers	%Farmers	%Farm.	%Farm.	%Farmers
January	9.5	-	-	2.4	-	2.4
February	-	4.8	-	2.4	-	-
March	4.8	-	4.8	2.4	2.4	-
April	7.1	2.4	4.8	2.4	-	-
May	61.9	-	4.8	33.3	-	-
June	16.7	9.5	35.7	23.8	7.1	7.1
July	-	14.3	28.6	16.7	2.4	2.4
August	-	-	7.1	7.1	-	11.9
Septemb.	-	4.8	9.5	7.1	-	31.0
October	-	-	-	-	-	21.4
November	-	-	-	-	-	7.1
December	-	-	-	2.4	-	16.7
	100.0 (N=42)	35.8 (N=42)	95.3 (N=42)	100.0 (N=42)	11.9 (N=42)	100.0 (N=42)

FIG. 1: CALENDAR OF AGRIC. ACTIVITIES

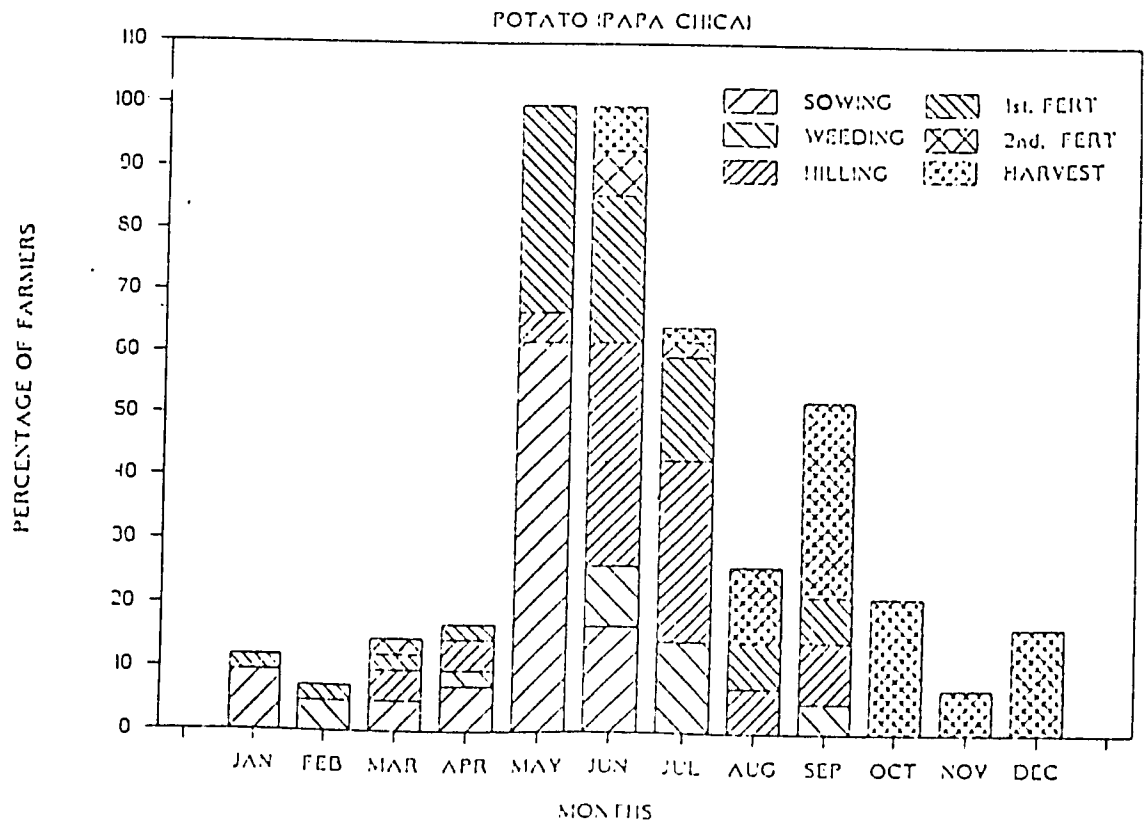
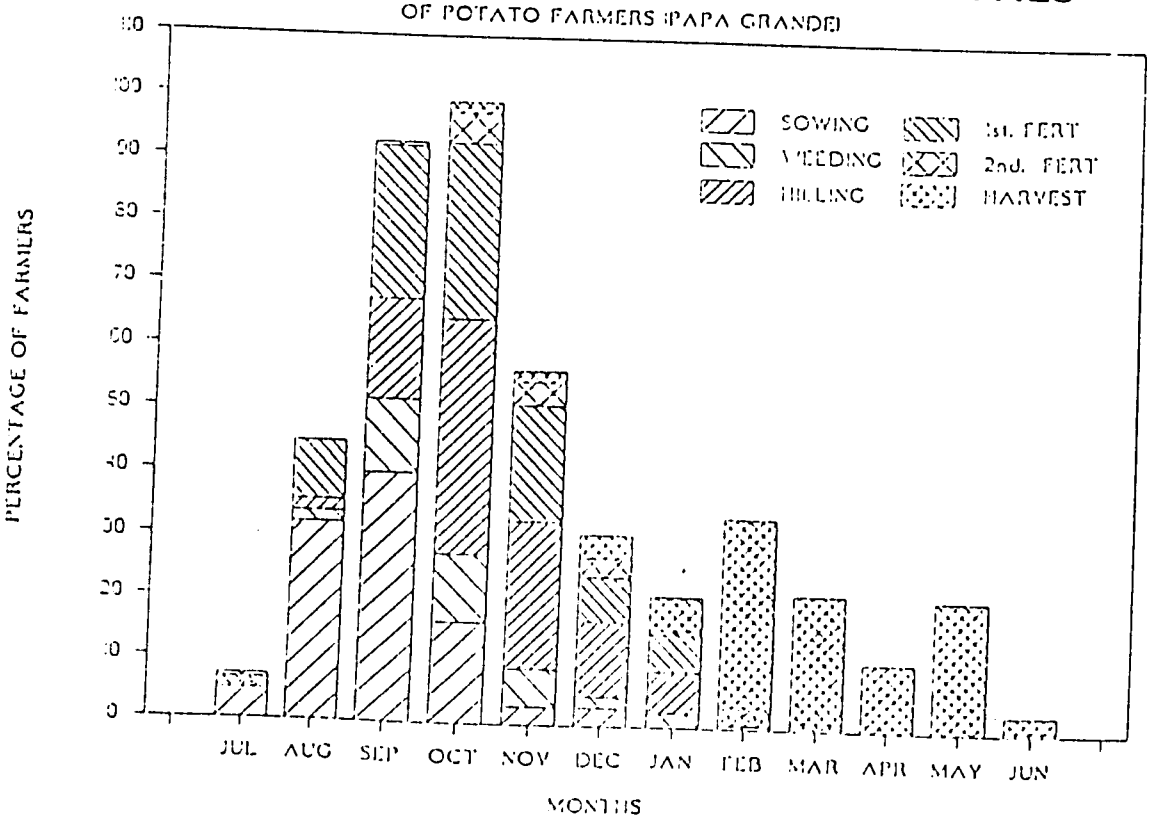


TABLE 11: Calendar of Agricultural Activities Performed By Potato Farmers (papa grande)

Activity	Sowing	Weed Control	Hilling	First Fert.	Second Fert.	Harvesting
Month	%Farmers	%Farmers	%Farmers	%Farm.	%Farm.	%Farmers
July	4.9	-	0.6	1.2	0.6	-
August	32.3	1.8	1.8	9.1	-	-
Septemb.	40.2	11.6	15.9	24.4	0.6	-
October	16.5	11.0	37.2	28.0	4.9	1.8
November	3.0	6.1	23.8	18.3	3.7	1.8
December	3.0	1.8	12.2	7.3	3.0	3.7
January	-	2.4	6.7	6.1	0.6	5.5
February	-	0.6	1.2	0.6	1.2	30.5
March	-	0.6	0.6	-	-	20.7
April	-	-	-	-	-	11.0
May	-	-	-	-	-	21.3
June	-	-	-	0.6	-	2.4
	100.0 (N=164)	35.9 (N=164)	100.0 (N=164)	95.7 (N=164)	14.6 (N=164)	99.4 (N=164)

FIG 2: CALENDAR OF AGRIC. ACTIVITIES OF POTATO FARMERS (PAPA GRANDE)



sowed may be subtracted from the months in which weed control was carried out, but this would yield an interval of one to eight weeks. For example, if a farmer sowed at the end of August and removed weeds at the beginning of September, or if he sowed at the beginning of August and removed weeds at the end of September, subtracting August from September would yield a figure of one which can only be interpreted as representing a period of 1 - 8 weeks. This interval is too large and cannot be used to assess the correctness of timing.

3. Hilling

In this operation the soil around the plants is tilled with a hoe or some other implement. In the process all weeds around the plants are removed and some soil is pulled towards the bases of the plants on all sides thereby producing small hills with the plants protruding from the centers.

Hilling was carried out by practically all farmers (95 % and 100 % for Papa Chica and Papa Grande respectively). This activity was performed mostly from June to July for Papa Chica and during September to December for Papa Grande. The data seem to indicate that this activity usually commenced about four weeks after sowing, but this cannot be determined exactly since, as for weed control, data were collected on months rather than on a specific time after sowing.

4. Fertilizing

All Papa Chica potato farmers (100 %) and 96 % of Papa Grande farmers indicated one or more months during which they applied first and second fertilizers. It is assumed that the mention of two different months indicated two applications of fertilizers, and one month indicated one application. The data indicate that one application of fertilizer was mostly practiced, and less than 15 % of the farmers made two applications.

The first application of fertilizers was concentrated in the periods May to July for Papa Chica farmers and September to November for Papa Grande farmers.

The timing of fertilizer applications relative to sowing cannot be determined exactly. This is so because, as for weed control and hilling, data were collected on the months in which the activity was performed and not on the number of days after sowing.

B. CORN

1. Sowing

Sowing of corn was restricted to a shorter period compared

to potato. It extended from July to December with concentration during August to October (Table 12 and Figure 3). However, September was the most active sowing month (66 % of all corn farmers).

2. Weed Control

As for potato, weed control for corn was not widely practiced as a separate activity. Only 35 % of all corn farmers indicated that they carried out weed control, and the did so mostly from September to November. Weed control was also combined with hilling.

The timing of weed control relative to sowing could not be determined for the same reasons discussed under potato.

3. Hilling

Hilling was practiced by practically all farmers (98 %). This activity was carried out mostly between August and December.

The timing of hilling relative to sowing also could not be determined because of the type of data collected.

4. Fertilizing

Single application of fertilizer was also practiced by a high percentage of corn farmers (92 %). Only 2.4 % practiced two applications. The intensity of this activity was greatest during September - November (Figure 3).

The timing of fertilizer application relative to sowing could not be determined because of the type of data collected.

C. WHEAT

1. Sowing

Sowing of wheat took place over a more extended period than corn. This activity was carried out from August of one year to May of the following year with concentration in the period December - February (Table 13 and Figure 4).

2. Weed control

Weed control as a separate activity was practiced by 97.3 % of wheat farmers. Since hilling is not a common activity in the cultivation of wheat, weed control could not be combined with hilling. Therefore, unlike potato and corn, a very high percentage of farmers practiced weed control separately from hilling.

TABLE 12: CALENDAR OF AGRICULTURAL ACTIVITIES PERFORMED BY CORN FARMERS

Activity	Sowing	Weed Control	Hilling	First Fertilizing	Second Fertilizing	Harvesting
Month	% of Farmers					
June	-	-	-	-	-	-
July	.5	-	-	-	-	-
August	14.0	2.8	-	-	-	-
September	65.9	7.5	12.1	13.6	-	-
October	16.4	14.5	47.7	44.9	-	-
November	2.8	7.5	24.3	19.2	0.5	-
December	0.5	2.3	11.2	11.2	0.9	0.5
January	-	-	2.3	2.8	0.5	1.4
February	-	-	0.5	0.5	0.5	7.0
March	-	-	-	-	-	12.6
April	-	-	-	-	-	11.7
May	-	-	-	-	-	49.5
June	-	-	-	-	-	14.0
July	-	-	-	-	-	1.4
August	-	-	-	-	-	1.9
	100.00 (N=214	34.6 (N=214	98.1 (N=214	92.2 (N=214)	2.4 (N=214)	100.00 (N=214)

FIG.3: CALENDAR OF AGRIC. ACTIVITIES OF CORN FARMERS

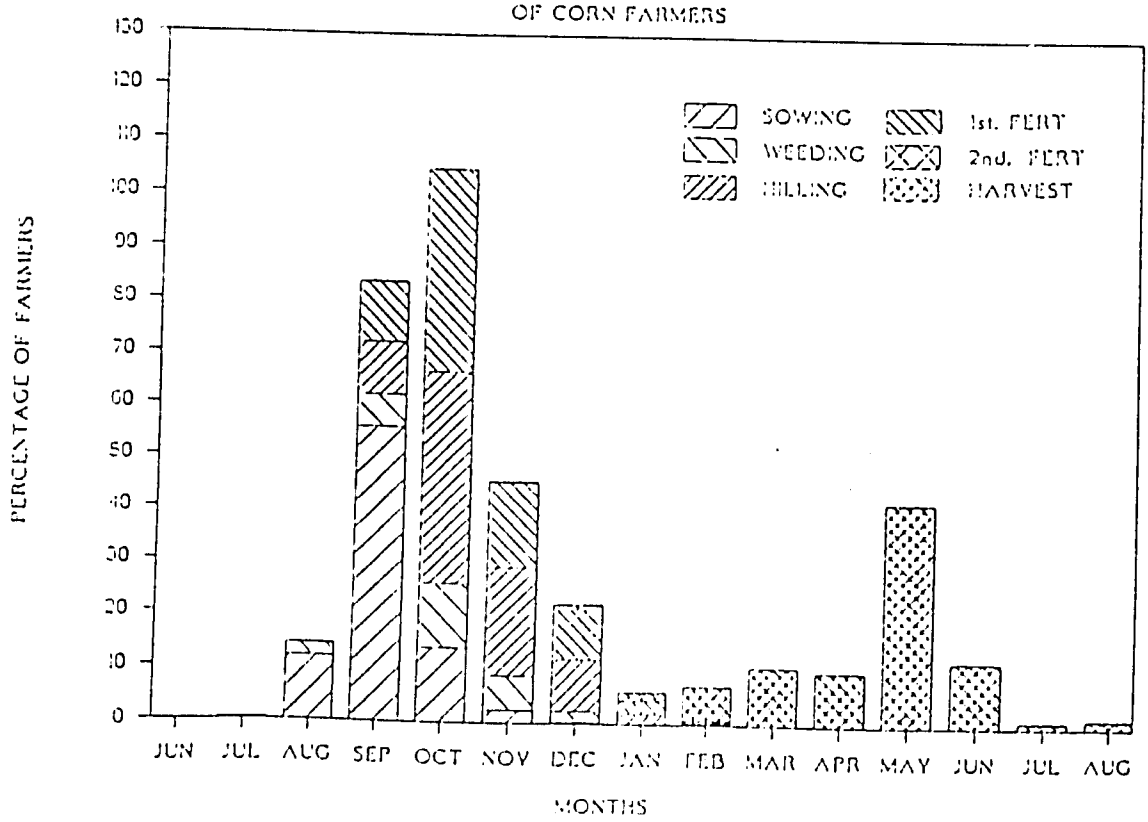
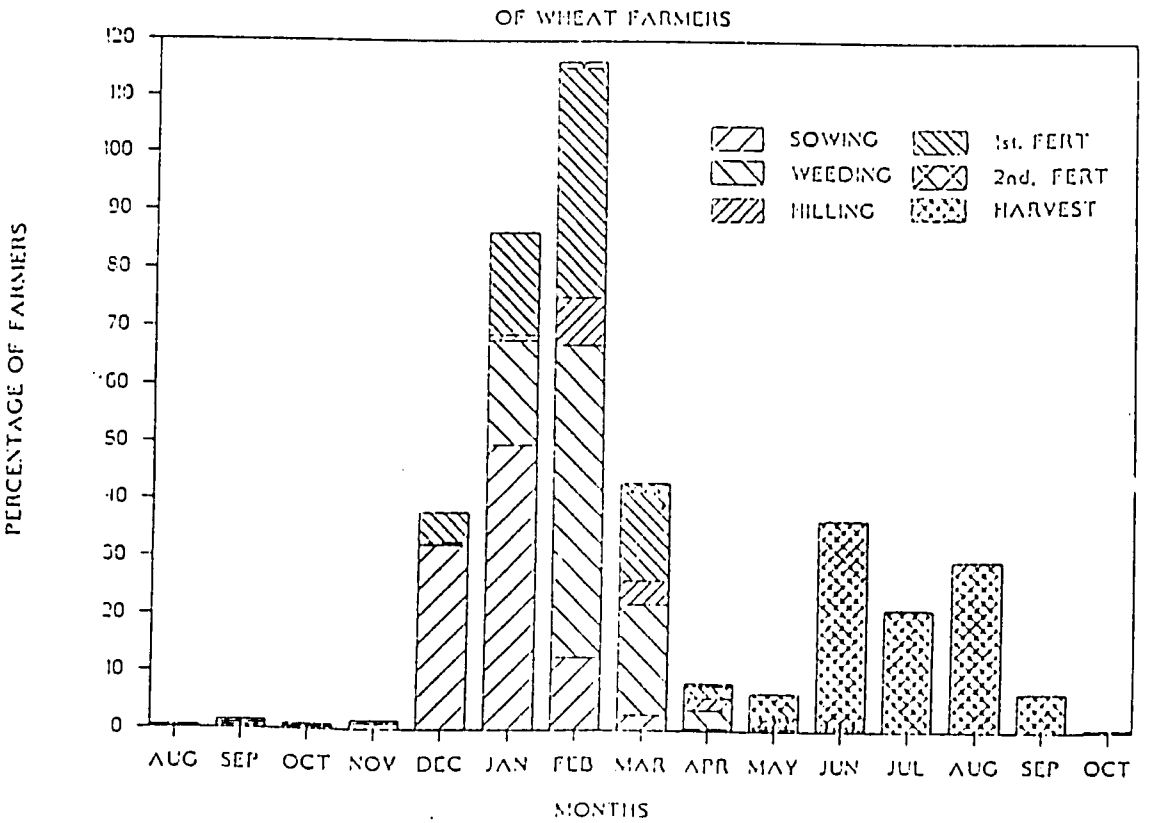


TABLE 13: CALENDAR OF AGRICULTURAL ACTIVITIES PERFORMED BY WHEAT FARMERS

Activity	Sowing	Weed Control	Hilling	First Fertilizing	Second Fertilizing	Harvesting
Month	% of Farmers					
August	.5	-	-	-	-	-
September	0.5	0.5	0.5	-	-	-
October	.0	0.5	0.5	-	-	-
November	1.0	-	-	0.5	-	-
December	32.1	0.5	-	5.2	-	-
January	49.7	18.1	1.0	17.6	-	-
February	12.6	54.4	8.3	39.9	1.0	-
March	2.6	19.2	4.1	15.5	-	1.6
April	0.5	3.1	2.1	2.1	-	0.5
May	0.5	0.5	1.0	0.5	-	4.1
June	-	0.5	0.5	0.5	-	35.2
July	-	-	-	-	-	21.2
August	-	-	-	-	-	29.5
September	-	-	-	-	-	6.7
October	-	-	-	-	-	0.5
	100.00 (N=194	97.3 (N=194)	18.0 (N=194)	81.8 (N=194)	1.0 (N=194)	99.3 (N=194)

FIG.4: CALENDAR OF AGRIC. ACTIVITIES



The most active weed control period was January - March. Timing of weed control relative to sowing could not be determined because of the type of data collected.

3. Hilling

Hilling is not a common activity in the cultivation of wheat. In fact, one would expect to find less than the reported 18 % of farmers practicing hilling of wheat.

4. Fertilizing

Fertilizing of wheat was practiced by 82 % of farmers. This is slightly lower than similar percentages for potato and corn, but it is also a very high percentage. Also, for wheat, only 1 % of the farmers practiced two applications of fertilizers.

Fertilizing of wheat was done mostly during December, January and February. The timing of fertilizing relative to sowing also could not be determined because of the type of data collected.

D. MONTHLY INTENSITY OF LABOR DEMANDS

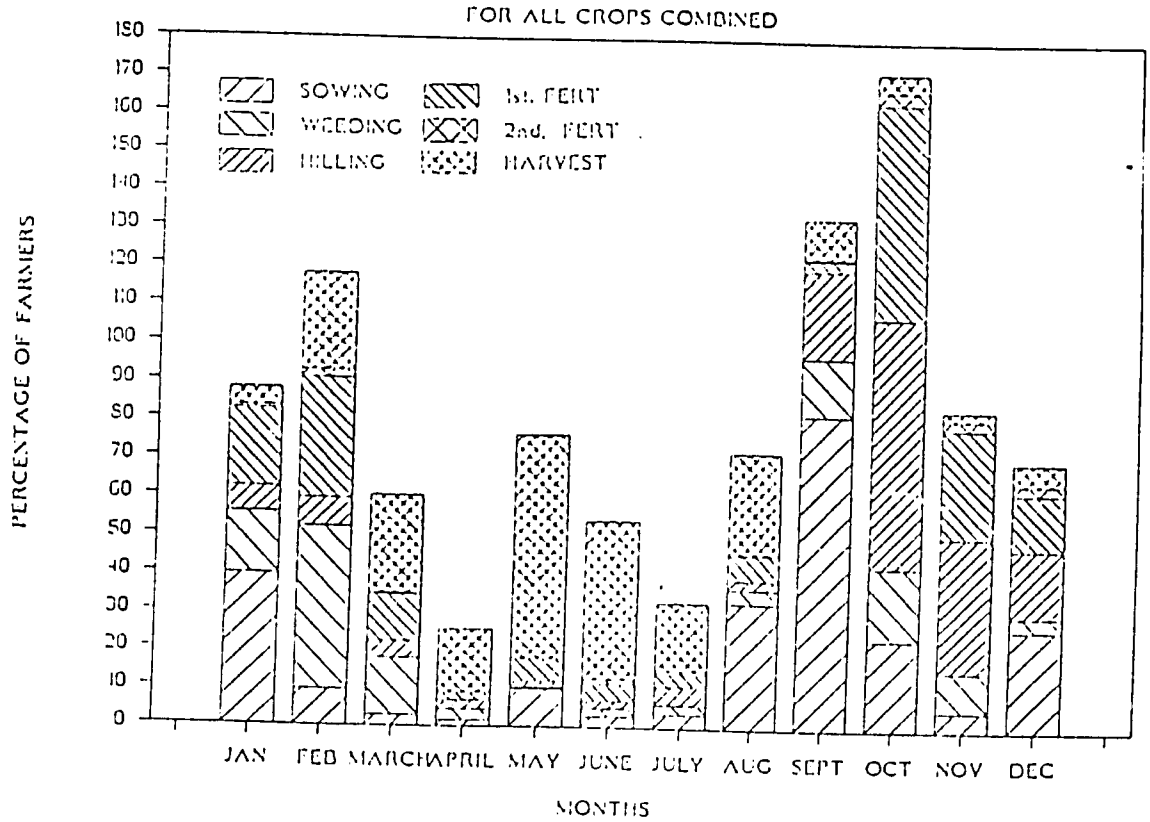
The intensity of monthly labor demands for the six agricultural activities for which data were collected is presented in Table 14 and Figure 5. In this table all similar activities of all crops are combined by calendar month and presented for a normal calendar year. For example, all farmers sowing potato, corn and wheat in January are summed and then converted to a percentage of all 252 farmers in the sample. These percentages were then plotted to produce Figure 5 which clearly shows the relative intensity of activities by month and also the particular type of activities (not separated by crop) carried out in each month.

For example, September and October were the most active months of the year during which there were sowing, weeding, hilling, and first fertilizing. Also, in the month of May the activity was mainly harvesting. On the other hand, based on the data collected, April was the least active month. It is possible that in reality the labor demands for the period April to August would increase when land preparation activity is included. Also, a similar increase should be expected for the other months when plant protection activities are included.

TABLE 14: Calendar of Agricultural Activities For All Farmers For All Crops Showing Intensity for Each Calendar Month

	% Farmers That Performed Activities (N=252)					
Months	Sowing	Weed Control	Hilling	First Fert.	Second Fert.	Harvesting
January	39.7	15.9	6.7	20.2	0.8	4.8
February	9.5	42.5	7.5	31.3	2.0	25.0
March	2.8	15.1	4.4	12.3	0.4	25.4
April	1.6	2.8	2.4	2.0	-	16.7
May	9.9	0.4	1.6	6.0	-	58.7
June	2.8	2.0	2.0	4.4	1.2	41.7
July	3.6	2.4	4.8	3.2	0.8	17.9
August	32.9	3.6	2.4	6.7	-	26.6
September	82.1	15.1	22.6	2.8	0.4	10.3
October	23.8	19.0	64.7	56.3	3.2	4.8
November	5.2	10.3	35.3	28.2	2.4	2.4
December	26.6	3.6	17.5	14.7	2.4	5.6

FIG.5: CALENDAR OF AGRIC. ACTIVITIES



CHAPTER V

AGRICULTURAL TECHNOLOGY USED BY FARMERS

Quantitative data were collected on the following aspects of agricultural technology practiced by farmers:

- amount of seeds used
- use of selected seeds by crops
- types of fertilizers used
- types of pesticide applied.

Qualitative data not reported here, but which are useful in developing a strategy to assist farmers improve their agricultural technology, were collected by other methods on the following practices:

- planting distances
- varieties of seeds planted
- treatment of seeds before planting
- yields from different varieties planted
- quantities of fertilizers applied
- quantities of pesticides applied
- for what pests and/or diseases were pesticides used
- timing of fertilizer and pesticide applications (i.e., approximate number of days after sowing)
- methods of weed control
- storage of produce for seeds and for consumption.

The quantitative data collected on agricultural technology is presented below.

A. SOWING

1. Seed Rate

The amount of seeds farmers use per hectare is an important indicator of plant density, and plant density is an important determinant of yields per unit of land. Recommended seed rates provide the optimum number of plants at the optimum planting distances. Because varieties of a particular crop vary in their planting distances in accordance with their morphological and genetic characteristics, seed rates also vary with varieties. However, for simplification, two broad categorizations can be made for varieties: local or indigenous varieties, and improved varieties. The planting distances and seed rates for these two categories vary considerably. But all local varieties tend to have very similar seed rates, and the seed rates of improved varieties also do not differ very much from each other. Knowing the seed rates and varieties farmers use is very important in deciding on strategies to improve farmers' productivity.

TABLE 15A: Seed Rate Used by Potato Farmers

Kg/Hectare	% Farmers
1 - 400	13.2
400.1 - 800	22.7
800.1 - 1000	27.3
1000.1 - 1200	15.7
1200.1 - 1400	4.5
1400.1 - 1600	4.5
1600.1 - 1800	2.5
1800.1 - 2000	2.0
2000.1 - 2200	0.5
2200.1 - 2400	3.0
>2400	4.0
	100.0 (N=198)

Table 15B: Seed Rates Used by Corn Farmers

Kg/Hectare	% Farmers
1 - 20	9.8
20.1 - 30	10.7
30.1 - 35	0.5
35.1 - 40	9.3
40.1 - 45	1.9
45.1 - 50	27.6
50.1 - 60	11.7
60.1 - 70	0.5
> 70	28.0
	100.0 (N=214)

All farmers were asked to indicate the amount of seeds they were using for each crop they cultivated. The amount of seeds used for each crop was divided by the areas they said they cultivated for each crop. For example, the amount of corn seeds each farmer used was divided by the area he/she cultivated with corn to determine the seed rate used. The distribution of calculated seed rates for potato, corn, and wheat are presented in Tables 15A, 15B, and 15C respectively. These seed rates should be interpreted cautiously for two reasons. Firstly, the

areas cultivated may not be entirely correct for all farmers because of the way the areas were obtained (see Chapter 111). Secondly, the varieties used by farmers were not determined, but it may be assumed that they were cultivating mostly local varieties. The calculated seed rate, therefore, could not be separated by varieties.

Table 15C. Seed Rates Used by Wheat Farmers

Kg/Hectare	% Farmers
1 - 20	5.2
20.1 - 40	8.2
40.1 - 60	9.8
60.1 - 80	9.3
80.1 - 100	22.7
100.1 - 110	0.5
110.1 - 120	18.0
120.1 - 130	-
130.1 - 140	0.5
> 140	25.8
	100.0 (N=194)

a. Potato

The recommended seed rate for potato was 2000 kg/ha for improved varieties and 1200 kg/ha for local varieties[7]. This varied somewhat for different sizes of seed-potato used. The data collected did not indicate sizes of seed-potato used.

If all farmers were using local varieties, their seed rate should have been 1200 kg/ha. The data indicate that 74 % of potato farmers were using less than 1200 kg/ha (taken from the computer print out). If an acceptable range was 1001 - 1200 kg/ha, then 63.2 % of the farmers were using less than the lower limit of this range, and only 15.7 % were using this amount of seed (Table 15A).

If 2000 kg/ha was the required seed rate, then 90.4 % of the farmers were using less than this amount (taken from the computer printout). If an acceptable range was 1801 - 2000 kg/ha, then

---

[7] Seed rate is among the recommendations for potato provided by Ing. Armando Quispe Caceres, Investigador Agrario en Papa, CIPA Ancash, May 7, 1987.

90.4 % of the potato farmers were using less than the acceptable amounts of seeds. Also, only 2 % were using the required quantity of seed. The data also indicate that a small percentage of farmers (7.5 %) were using more than the recommended rate.

b. Corn

The recommended seed rate for corn was 40 kg/ha[8]. The data indicate that 24.8 % of the corn farmers were using less than this recommended amount (taken from the printout). If 35 - 40 kg/ha was an acceptable range, then 21 % of the corn farmers were using less than the lower limit of this range, and only 11.2 % were using rates within this range (Table 15B). But 67.8 % of the corn farmers were using seed rates higher than the upper limit of this range. Amazingly, 28 % were using more than 70 kg/ha. This last statistic needs further investigation. It may be reflecting a problem with the area cultivated as discussed previously.

c. Wheat

The recommended seed rate for wheat was 120 kg/ha[9]. The data indicate that 56.2 % of wheat farmers were using less than the recommended rate (taken from the printout). If an acceptable range was 110 - 130 kg/ha, then 55.7 % of the farmers were using less than the lower limit of this range, and only 18 % were using seed rates within this range (Table 15C). A considerable percentage (26.3 %) of wheat farmers were also using seed rates much higher than the upper limit of this range.

2. Seed Sources

Seed sources is an important indicator of the quality of seeds used by farmers. If seeds were obtained from Government or other certified seed producers the quality of seeds would be good. Most likely the seeds would be that of improved varieties, and free of insect damage and diseases. If seeds were bought in the markets there was no guarantee that the seeds were produced by healthy plants. This is important because seeds can transmit many diseases from parent plants to progeny plants. A crop grown from unhealthy seeds will not only be unhealthy but will also produce very little. If a farmer uses his own seeds, i.e., part of his produce, he may also experience these same problems if he knows very little about the production of healthy seeds. It is

---

[8] Seed rate is among the recommendations provided by Ing. Jose Millones, Coordinador Prog. Maiz, CIPA, Ancash, May 12, 1987.

[9] Seed rate is among the recommendations provided by Ing. Valencia, Especialista de Cereales, CIPA, Ancash, May,1987.

also not recommended that a farmer use his own seeds forever. His seed stock should be changed at regular intervals. But it should be changed with healthy seeds from certified seed producers or from other farmers who are producing healthy seeds.

All farmers were asked where they obtained the seeds they used for each crop they cultivated. The sources mentioned were: themselves (i.e. their own seeds), markets or other farmers, INIPA, CIP, and CEDEP - a non-profit rural development organization that provided free seeds and technical assistance to some farmers. The data collected on these seed sources for each crop is presented in Table 16. The Table shows how often farmers used these seed sources for potato, corn, and wheat. For example, for 68.6 % of the 210 potato planting instances, farmers used their own seeds.

The seeds mostly used for the majority of planting instances for all three crops were farmers own seeds. This was the case for 68.6 %, 88.1 % and 89.9 % of the potato, corn and wheat planting instances respectively. For large percentages of instances farmers also bought seeds from the markets and other farmers. Because of the high prevalence of pests and diseases on these crops, most of these seeds (own and bought) might have been unhealthy. If so, the productivity of the crops grown from these seeds would have been seriously affected as a result of diseases contracted from parent plants.

TABLE 16: Distribution of Seed Sources For Each Crop

Seed Sources	% of Planting Instances		
	Potato (N=210)	Corn (N=218)	Wheat (N=196)
Own Seed	68.6	88.1	89.9
Farmers,markets	24.8	9.2	7.1
INIPA, CIP	1.9	1.8	2.5
CEDEP	3.8	0.9	0.5
No information	0.9	-	-
	100.0	100.0	100.0

It may be assumed that the only certified seeds used were those bought from CIPA (Central Institute for Agricultural Research), CIP (International Potato Center), and those received from CEDEP. These were used for 5.7 % of the potato planting instances, 2.7 % of the corn planting instances, and 3 % of the

wheat planting instances. In terms of farmers, certified seeds were used by only 4 % of the 252 farmers in the sample.

a. Potato

The data on seed sources for potato indicate that the majority of farmers used their own seeds but a small percentage of farmers bought seeds (Table 16). It can be concluded that most farmers used for seed-potatoes the potato they themselves produced. No data is available on whether farmers cultivated special plots for seeds.

b. Corn

The distribution of seed sources used by corn farmers indicates a larger percentage (88 %) of own-seed users and a very small percentage (11 %) of purchased-seed users (Table 16).

c. Wheat

The distribution of seed sources for wheat farmers were almost identical with those for corn farmers (Tables 16).

3. Use of selected seeds

In further pursuit of the quality of seeds used by farmers, a more direct question was asked. Farmers were asked whether they used selected seeds, and 37.3 % of the 252 respondents said they did (taken directly from the computer printout). However, this statistic should be interpreted cautiously. The intent of the question was to determine whether farmers were using seeds of improved varieties. However, this question might not have produced the correct responses since the term 'selected' contained a degree of ambiguity. Farmers normally selected seeds from their harvest and they could have thought that the question asked about this practice rather than whether they were using improved seeds. Secondly, this statistic differs vastly from the 4 % who obtained seeds from certified seed producers (see above).

Those who said they used selected seeds were further asked to indicate the crops for which they used selected seeds. Their responses were: potato, corn, wheat, and 'all crops'. This last response was problematical. It was first necessary to determine what crops were cultivated by those who gave this response and then assign them as users of selected seeds for those crops. For example, if 29 of the 31 farmers who responded 'all crops' were cultivating potato, they were added to the other farmers who said they were using selected seeds for potato. The results of this procedure are presented in Table 17.

According to this table 41.9 % of the potato farmers, 25.2 % of the corn farmers, and 20.6 % of the wheat farmers were using 'selected' seeds. However, these figures vastly differ from those of the previous section and should be interpreted cautiously.

TABLE 17: Use of Selected Seeds By Crops

CROPS	Farmers That Cultivated Crop and Used Selected seeds
Potato	41.9 (N=198)
Corn	25.2 (N=214)
Wheat	20.6 (N=194)

TABLE 18: Reasons for Not Using Selected Seeds

Reasons Given	% Farmers That Did Not Use Selected Seeds (N=158)
Lack of Funds	50.6
Difficult to obtain seeds	6.3
Used Own Seed	41.1
Lack of Knowledge	24.1
Traditionally do not use Selected Seeds	9.5

4. Reasons for not using selected seeds

Those farmers who said they were not using selected seeds were also asked their reasons for not using selected seeds. They gave multiple responses and these are presented in Table 18. Their main reasons for not using selected seeds were lack of funds (50.6 %), use of their own seeds (41.1 %), and lack of knowledge (24.1 %). It is difficult to interpret what the farmers meant when they said that they did not use selected seeds because they were using their own seeds. Could it be that they thought their own seeds were good enough, and they did not need selected seeds, or that they did not want to use selected seeds? Nevertheless, lack of funds and lack of knowledge are explicit and have clear implications for the supporting institutions of credit and extension.

B. FERTILIZING

With respect to fertilizing it is important to ascertain: timing of fertilizer applications, number of fertilizer applications, types of fertilizers applied, and the quantities of fertilizers applied. Timing of fertilizer application and number of applications practiced by farmers were discussed in Chapter IV. No quantitative information was collected on quantities of fertilizers applied. In this section the types of fertilizers applied by farmers are discussed.

1. Types of Fertilizers Used

Data were collected on types of fertilizers applied by each farmer for each instance a crop was cultivated during the cropping year. Some farmers provided multiple responses corresponding to the types of fertilizers applied. The data were processed to isolate the combinations of fertilizers used by farmers for each crop. The results are presented in Table 19. This Table shows the percentages of instances each combination was used for each crop.

The data indicate several things:

a. Fertilizers were applied on almost all potato and corn plantings (96 % and 97 % respectively), and on 82 % of the wheat plantings. Use of fertilizer was one technology that was widely practiced.

b. Fertilizers were applied in 13 different forms on potato, 11 different forms on corn, and 8 different forms on wheat. Most of these were combinations of two or more of the following: nitrogen fertilizer[10], phosphorous fertilizer[11], potassium fertilizer[12], organic fertilizer (guano) and 12:12:12 mixed fertilizer. Since several different fertilizer recommendations were not being promoted in this area by CIPA, this implied great uncertainty among farmers about the correct combination of fertilizer to be used. On the other hand, it is possible that farmers through their own research had determined these combinations to be best for their particular soil. This, however, is questionable.

---

[10] The nitrogen fertilizers were urea, nitrate of ammonia, and sulfate of ammonia.

[11] The phosphatic fertilizers were calcium superphosphate and triple superphosphate of calcium.

[12] The potassium fertilizer was potassium chloride.

TABLE 19: Profile of Fertilizer Use

Fertilizer Combinations	% Planting instances		
	Potato (N=210)	Corn (N=218)	Wheat (N=196)
No fertilizer	3.8	7.3	18.4
NPK	16.7	1.8	-
NP	15.2	8.7	7.1
NK	2.4	0.5	-
PK	1.9	-	-
NP12	1.9	-	-
NK12	1.4	-	-
N12	5.7	-	1.5
P12	-	0.5	-
N Guano	4.3	2.8	3.1
P Guano	0.5	-	-
K Guano	-	-	0.5
NP Guano	-	0.5	-
K12	0.5	-	-
N only	28.1	69.3	60.2
P only	-	0.5	1.0
K only	-	0.5	-
Guano only	8.1	6.4	7.1
12 only	9.5	1.4	1.0
	100.0	100.0	100.0

N = Nitrogen fertilizer
P = Phosphate fertilizer
K = Potassium fertilizer
Guano = Organic fertilizer
12 = 12:12:12 (a mixed fertilizer)

c. The fertilizer recommendations[13] for potato and corn required the application of combinations containing nitrogen (N), phosphorous (P), and potassium (K). The mixed fertilizer 12:12:12 contains all these elements. Also, organic fertilizer, though containing mostly nitrogen also contains varying amounts of phosphorous and potassium. Therefore, combinations that contain NPK, or 12:12:12, or organic fertilizer (guano) may be considered as containing the required elements. For potato, nine of the combinations used contained these elements. These were applied on 48.6 % of the potato plantings. For corn, six of the

[13] The fertilizer recommendations were provided by the Central Institute for Agricultural Research in Ancash.

combinations contained the required elements and they were applied on 13.4 % of the corn plantings. Wheat did not require potassium, and combinations that contained nitrogen and phosphorous would have contained the required elements. Five of the combinations used on wheat did. These were applied on 20.3 % of the wheat plantings. It can be concluded that only for potato a substantial portion of the fertilizing provided the required elements.

Although several combinations contained the required elements, it was also necessary that they be applied in the correct amounts and at the correct time. Information on these aspects were not collected and therefore the correctness of the fertilizing practices cannot be entirely evaluated.

d. The single form of fertilizer that was mostly used contained nitrogen alone. This was the case for 28 % of the potato plantings, 69 % of the corn plantings, and 60 % of the wheat plantings. This is one of the most common malpractice of fertilizing in most developing countries.

e. Use of organic fertilizer was not a popular practice. It was applied in combination with other fertilizers or alone on 13 % of the potato plantings, 10 % of the corn plantings, and 11 % of the wheat plantings. Organic fertilizer, in addition to containing the required elements, enhances the structure of the soil and reduces soil destruction and soil erosion. Use of organic fertilizers is one practice that has substantial benefits and costs very little. Besides livestock manure, all organic waste produced on the farm can be converted into useful organic fertilizer. Promotion of this practice would be good strategy.

C. PLANT PROTECTION

Data were collected on the 'salience' of pests and diseases, the use of pesticides, the types of pesticides used, and reasons for not using pesticides. However, no data was collected to determine whether farmers were treating the pests and diseases they encountered on their farms with the correct pesticide(s), nor whether they were using the correct rates of application.

1. Salience of Pests and Diseases

Salience rather than incidence is used here because farmers were not asked whether they had incidence of pests and/or diseases but rather what they thought were the most important problems for potato, corn, and wheat. They were free to name more than one problem and several did provide multiple responses. The percentages of farmers that thought pests and diseases were problems are presented in Table 20 for potato, corn, and wheat.

For potato, farmers felt that Rancha, Papakuru and Tocto were the most important problems. Rancha was cited by almost all farmers (94 %), Papakuru by 61 % and Tocto by 44 %.

For corn, most farmers cited Gusano del choclo (89 %). For wheat, Polvillo was the most important (73 %) followed by Roya (38 %) and Empaje (37 %).

All three crops apparently suffered seriously from several pests and diseases. This makes a strong case for prevention and control programs.

2. Use of Pesticides

Farmers were asked what types of pesticides they used on each crop they cultivated. If the farmer had cultivated a particular crop twice for that cropping year he would have answered the question twice. Also, if a farmer had used pesticides for more than one crop he would have indicated so correspondingly. However, in order to determine what proportion of all the farmers used pesticides, a farmer was scored only once irrespective of the number of times he said he did use pesticides. In this way it was found that 55 % of all farmers had used pesticides.

The percentages of farmers that used pesticides in the cultivation of potato, corn and wheat are presented in Table 30. This table shows that 68.2 % of potato farmers, 56.5 % of corn farmers, and 56.2 % of wheat farmers had used pesticides. These percentages are substantially lower than the 'salience' of the most cited pests/diseases in Table 21. If 'salience' should correspond to incidence, then substantial percentages of farmers

did not use pesticides to control the most cited problems of potato, corn, and wheat.

Table 20: Incidence of Pests and Diseases Versus Use of Pesticides

A: POTATO

Pests/Diseases	% of Farmers (N=198)
Rancha	94.4
Papakuru	60.6
Tocto	43.9
Other Diseases	25.8
Other Pests	24.2

B. CORN

Pests/Diseases	% of Farmers (N=214)
Corn Ear Worm	88.8
Soil Pest	15.9
Polilla	17.3
Other Diseases	20.1
Other Pests	14.5

C. WHEAT

Pests/Diseases	% of Farmers (N=194)
Rust	38.1
Polvillo	72.7
Empaje	36.6
Other Diseases	19.1
Other Pests	8.2

3. Types of Pesticides Used

As indicated above, each farmer who used pesticides gave the names of the pesticide(s) he used. The data show that farmers

used 23 different types of pesticides (Table 22). Many of these are insecticides and others are fungicides.

TABLE 21: Use of Pesticides By Crops

Use of Pesticides	%Potato Farmers	% Corn Farmers	% Wheat Farmers
Used no pesticide Used pesticides	31.8 68.2	43.5 56.5	43.8 56.2
	100.0 (N=198)	100.0 (N=214)	100.0 (N=194)

TABLE 22: Frequency Distribution of Farmers By Pesticides Used For All Crops

Name of Pesticide	% of Farmers
1. Aldrex	1.5
2. Aldrin	10.1
3. Antracol	12.2
4. Bayfolan	7.9
5. Brestan	5.0
6. Cupravit	3.6
7. Curater	0.7
8. Difonate	0.7
9. Dipterex	1.5
10. Direx	1.5
11. Dithane	7.9
12. Fitoraz	2.2
13. Folidol	8.6
14. Furadan	5.0
15. Gusathion	1.5
16. Metasystox	9.4
17. Parathion	35.3
18. Perfection	3.6
19. Poliram Combi	1.5
20. Ridomil	41.7
21. Sevin	10.1
22. Tamaron	5.6
23. Vitavaz	0.7
Don't know name	4.3

However, of the 23 different pesticides, only Ridomil and Parathion were used by substantial percentages of farmers: 41.7% and 35.3 % respectively.

Aldrex, aldrin, antracol, metasystox and sevin were each used by about 10 % of thcse farmers who used pesticides. Because of the prevalence of insect and fungus problems, one would have expected most farmers to use more than one types of pesticide. It was found that 70 % of the farmers who used pesticides used two or more types (Table 23). However, whether farmers were using insecticides for insect problems, and fungicides for fungus problems cannot be determined from the data. Also, data were not collected to determine whether farmers were able to identify problems caused by insects, by fungus, by virus, by bacteria, etc. This was felt to be the responsibility of the baseline study.

TABLE 23: Profile of Pesticide Use for Farmers Who Used Pesticides

Number of Pesticides Used	% Farmers
1	29.6
2	54.5
3	12.2
4	1.5
5	2.2
	100.0 (N=139)

4. Reasons for not using Pesticides

All farmers, whether they used pesticides or not, were asked their reasons for not using pesticides. The reasons given by farmers for not using pesticides were: pesticide was not needed, lack of funds, lack of knowledge, traditionally did not use pesticides, and others (Table 24). For those farmers who did not use pesticides, lack of funds was the most important reason (72.6 %), and lack of knowledge ranked second (18.6 %).

For farmers who used pesticides, lack of funds (26.6 %) and lack of knowledge (32.4 %) were also the more important reasons. It may be interpreted that these farmers were sometimes affected by these factors.

Strangely 15.1 % of those who used pesticides reported that traditionally they did not use pesticides. This is difficult to

interpret unless they meant this was the case before they started to use pesticides.

One can safely conclude that the data indicate a great need for farmer education on the selection and use of pesticides.

TABLE 24: Reasons For Not Using Pesticides

A. Given by Farmers who did not use pesticides

Reasons	% Farmers who did not Use Pesticides
Not needed	4.4
Lack of funds	72.6
Lack of knowledge	18.6
Tradition	3.5
Others	0.9
	100.0 (N=113)

B. Given by Farmers who used pesticides

Reasons	% Farmers who Used Pesticides
Not needed	10.8
Lack of funds	26.6
Lack of knowledge	32.4
Tradition	15.1
Others	0.7
No information	14.4
	100.0 (N=139)

CHAPTER VI

INSTITUTIONAL SUPPORT

Data were collected on farmers' receipt of technical assistance and use of credit.

A. TECHNICAL ASSISTANCE

1. Receipt of Technical Assistance and Sources of Technical Assistance

Farmers were asked whether they received any form of technical assistance and if they did to indicate from where. 20.2 % of all farmers indicated that they had received technical assistance. Of those who received technical assistance 49 % received it from Government institutions (the Ministry of Agriculture and the National Institute for Agricultural Research and Extension), and 27.5 % from the Agricultural Bank. The other 23.5 % received technical assistance from other agencies. From the perspective of the total sample, Government Institutions provided technical assistance to only 9.9 % of all farmers sampled. This reflected an extremely low level of extension coverage.

2. Types of Technical Assistance Received

The types of technical assistance and the percentages of farmers that received them are presented in Table 25. The percentages are calculated for all farmers in the sample (N = 252) and for those who indicated that they had received technical assistance (N = 51).

Most of the technical assistance received was categorized as 'visits'. This was the case for 78 % of those who received technical assistance. This is not very helpful in the interpretation of the data especially since many of the visits could have been social visits made not for the purpose of imparting technical assistance. Also, some visits could have been made by sellers of inputs promoting the sale of their products. This seems to be a reasonable deduction since visits were distinguished from agricultural advice in the responses. Of those who received technical assistance 41.2 % received agricultural advice, but this represented only 8.3 % of all farmers. The data also do not indicate whether the agricultural advice came from the Ministry of Agriculture or from vendors of agricultural inputs.

3. When Was Technical Assistance Last Received?

In response to this question, 37 % of those who received technical assistance said they did so within one year or less

prior to the date of the data collection. But the other 63 % did so two or more years prior to the date of data collection, and 24 % of these did so more than four years prior to data collection. The receipt of technical assistance was certainly not a recent event for most farmers.

TABLE 25: Types of Technical Assistance Farmers Received

Type of Tech. Assistance	% Farmers (N=252)	% Farmers (N=51)
Visits	15.8	78.4
Demonstrations	1.2	5.9
Credit	1.6	7.8
Inputs	2.4	11.8
Advice	8.3	41.2

4. Farmers' Perception of Utility of Technical Assistance

Farmers were asked if they should receive technical assistance whether it would improve their cultivation? And 92.1 % of all farmers believed that technical assistance would improve their cultivation. However, the types of technical assistance they had in mind were not determined.

5. Reasons for not Receiving Technical Assistance

The farmers who did not receive technical assistance were asked to indicate, from their point of view, what were the reasons for not receiving technical assistance. Those who said they received technical assistance should not have been excluded from answering this question since the majority of them did not receive any recently. However, 70 % of those who did not receive technical assistance thought they were not receiving technical assistance because the extension officers simply did not visit them. Another 15 % did not know where to obtain it, and 13 % were not interested or did not need any. The most important conclusion is that the extension officers simply did not visit the farmers.

6. Where Would Farmers Seek Advice?

Where farmers would seek advice when they have a problem is also a good indicator of their familiarity with, and their confidence in, the technical services operating in their area. This aspect was pursued by asking all farmers to indicate from whom they would seek advice if they have a problem. The

responses are tabulated in Table 26. The data shows that only 26.2 % of the farmers would seek advice from the government technical institutions. This is substantially larger than the 9.9 % that actually received technical assistance from these institutions. The vendors of inputs were also playing a small but important role in providing technical assistance. Considering the large percentages of farmers that were using fertilizers and pesticides, one would have expected a larger percentage of farmers to seek advice from them. Amazingly, the majority of farmers (61.1 %) would not seek advice from these technical sources. This may be indicating unfamiliarity with the technical services available as a result of the scarcity of the extension officers.

The fact that one third of the farmers would seek advice from family, friends, and neighbors can result in greater problems if those consulted do not know the solutions to the problems on which they are consulted but still offer advice. Strikingly also 26 % of the farmers would not seek advice from anyone. It should not be assumed that these knew the solutions to all their problems. Overall, the data indicate a dire need for a good communication and extension strategy that would initially increase the visibility of technical officers and educate farmers on the technical services available and how to take advantage of them.

Table 26: Sources of advice that will be sought when there is a problem

Sources of Advice	% Farmers
Min. of Agric. or INIPA	26.2
Sellers of inputs	12.7
Family and friends	33.3
No one	25.8
Others	2.0
	100.0

7. Who Could Provide The Best Agricultural Advice?

Farmers were also asked this question, but the structure of the question was ambiguous and the results obtained are difficult to interpret.

B. USE OF CREDIT

Farmers were asked whether they used credit. Those who did were further asked for what crops, and those who did not were asked why they did not.

Only 24.2 % of all farmers indicated that they used credit to finance some aspects of their farming. Of those who used credit 92 % used it for potato, 23 % for corn, and 16.4 % for wheat (Table 27).

Farmers' reasons for not receiving credit are listed in Table 28. Fear of risks (fear of inability to repay) was the most prevalent of the reasons listed (52.1 %). Having too little land[14] and documentation problems (difficult requirements and lack of knowledge of requirements and procedures) were cited by 38.9 % and 28.9 % respectively. About 9 % of farmers were not interested in credit.

No data was collected on the amount of credit received nor when was the last time farmers obtained credit.

TABLE 27: Use of Credit by Crops Cultivated

Crops	% Farmers That Used Credit
Potato	92.0 (N=61)
Corn	23.0 (N=61)
Wheat	16.4 (N=61)

TABLE 28: Farmers' Reasons for Not Using Credit

Reasons	% Farmers (N=190)
Fear of Risks	52.1
Too little land	38.9
Documentation problems	28.9
Not interested in credit	9.5
Other Reasons	4.2

14 The minimum amount of land required to qualify for credit was one hectare.

CHAPTER VII

USE OF RADIO

A. RADIO AUDIENCE

Data were not collected on ownership of radios. However, a good estimate of this measure may be obtained from the number of farmers who normally listened to radio.

All farmers were asked whether they listened to radio, and the vast majority (84.9 %) indicated that they normally did. The vast majority of farmers also preferred Radio Ancash (84.1 %). Two other radio stations - Radio Union and Radio Huaraz - also had substantial audiences: 55.2 % and 42.9 % respectively (Table 29). Radio Ancash and Radio Huaraz were transmitting from Huaraz, the main city in the Department of Huaraz. Also, Radio Ancash had a 3 kw. medium wave, a 5 kw. short wave, and a 500 kw.F.M. channel with departmental, national, and local coverage respectively. Radio Huaraz on the other hand had only one 1 kw channel which could be received within a 40 km. radius from the station.

TABLE 29: Distribution of Farmers by Radio Stations Listened To

Radio Station	% of Farmers (N=252)
Radio Ancash	84.1
Radio Union	55.2
Radio Huaraz	42.9
Other Stations	21.0

B. REASONS FOR FARMERS' PREFERENCE FOR RADIO STATIONS

Farmers were asked their reasons for preferring the radio stations they normally listened to. The majority of farmers cited news (65.9 %) and music (48.0 %) as their most important reasons. Quechua language and good reception were also important factors in their choice of radio stations but agricultural advice was the least important (Table 30).

The responses farmers provided to the question asking about the radio programs to which they listened reflected their preferences listed above. 70.2 % listened to news programs, 65.1 % listened to Huaynos music (indigenous Andean music), 43.6 % listened to agricultural programs (Amanecer Campesino and 'On Agriculture' programs). Messages, in which announcements of

TABLE 30: Why Farmers Prefer the Radio Stations They Listened To

Reasons	% of Farmers (N=252)
News	65.9
Music	48.0
Quechua Language	27.8
Good Reception	31.7
Agricultural Advice	17.1

TABLE 31: Radio Programs Farmers Listened To

Radio Programs	% of Farmers (N=252)
News	70.2
Huaynos Music	65.1
Amanacer Campesino	34.1
Messages	27.4
On Agriculture	9.5
Others	0.4

TABLE 32: Times Farmers Listened to Radio

Time	% of Farmers (N=252)
4.00 - 5.00 AM	25.0
5.00 - 6.00 AM	40.9
6.00 - 7.00 AM	16.7
7.00 - 8.00 AM	10.3
Noon - 1.00 PM	6.3
1.00 - 2.00 PM	3.6
5.00 - 6.00 PM	17.1
6.00 - 7.00 PM	21.0
After 7.00 PM	11.1
Anytime	7.5

deaths, etc. were made, was also a popular program (Table 31). The slight discrepancy between the low importance of agricultural advice in choice of radio stations and the substantial popularity of agricultural programs (Amanacer Campesino) was probably due to the Quechua language and Andean music used in the programs. Farmers were probably more interested in the music than the advice.

C. POPULAR LISTENING TIME

Farmers were also asked to indicate what time they were listening to radio programs. They were presented with choices of hourly intervals from 4 a.m to 8 a.m. and from 5 p.m. to 7 p.m. or later. The data indicate that more farmers listened to radio in the morning than in the evening, and 5.00 a.m. - 6.00 a.m. was the most popular time (Table 32). However, there was also a sizeable audience between 5 p.m. and 7 p.m.

D. PREFERRED TIMES FOR AGRICULTURAL PROGRAMS

Farmers were also asked to indicate the times they would prefer to have agricultural programs broadcasted. Their preferences corresponded closely with their listening habits. Most farmers preferred mornings between 4.00 a.m. and 7.00 a.m., but 5.00 a.m. to 6.00 a.m. was the most preferred time (Table 33).

TABLE 42: Time Farmers Preferred for Radio Agricultural Programs

Time Preferred	% of Farmers (N=252)
4.00 - 5.00 AM	16.3
5.00 - 6.00 AM	43.7
6.00 - 7.00 AM	28.6
7.00 - 8.00 AM	5.2
5.00 - 6.00 PM	12.7
6.00 - 7.00 PM	12.3
After 7.00 PM	8.3
Other	0.4

E. SUGGESTIONS FOR IMPROVING AGRICULTURAL RADIO PROGRAMS

Farmers were also asked their suggestions for improving the agricultural radio programs. They suggested that the program(s): should be expanded, probably meaning to increase the duration of the program; should also provide more explanations; should give more agricultural advice; and should give more information on plant protection and livestock. A substantial amount of farmers also preferred the use of Quechua language in the agricultural programs (Table 34).

TABLE 34: Suggestions Given By Farmers to Improve Agricultural Radio Programs

Suggestions	% of Farmers (N=252)
Expand it	42.5
More explanations	9.5
Speak in Quechua	36.5
Give more agricultural advice	38.5
More on pests and diseases	17.1
More on livestock	8.3
More music	6.3

TABLE 35: Radio Listening versus Use of Agricultural Technology/Support Services

Agric. Technology/ Problems/Support Services	% of Farmers that Listen to Radio	
	Farmers Who Used Tech/Sup. Services	Farmers Who Did Not Use Tech/Sup. Services
Selected Seeds	91.5 (N=94)	81.5 (N=157)
Pesticides	90.6 (N=139)	78.6 (N=112)
Fertilizers	85.3 (N=245)	83.6 (N=6)
Receive Tech. Asst	96.1 (N=51)	83.0 (N=194)
Use Credit	93.4 (N=61)	82.5 (N=189)
Believed Tech. Asst. Would Improve Productivity	86.1 (N=231)	70.6 (N=17)

F. RADIO LISTENING VERSUS USE OF AGRICULTURAL TECHNOLOGY AND SUPPORT SERVICES

Radio listening by farmers who used agricultural technologies and by farmers who did not use agricultural technologies were compared (Table 35). The data indicate that 86.1 to 96.1 % of those who used technologies and support services were listening to radio, and 70.6 to 83.6 % of those who did not use technologies also were listening to radio. Radio, therefore, has the potential of reaching very large percentages of both types of farmers, and well planned radio programs properly implemented has the potential to make an impact on these farmers' present level of technology use.

While cause and effect is not implied there seems to be a strong relationship between radio listening and use of technologies. Table 36 indicates that for zero to three technologies[15], the percentages of farmers that listened to radio increased with the number of technologies used. That is, of the 96 farmers who used only one of the three technologies investigated, 78 % were listening to radio and 22 % were not, but for the 78 farmers who used all three technologies investigated, 92 % were listening to radio and 8 % were not.

TABLE 36: Radio Listening vs the Number of Technologies Used

Number of Technologies Used	Listened To Radio	Did Not Listen to Radio	N =
0	66.7	33.3	3
1	78.1	21.9	96
2	87.8	12.2	74
3	92.3	7.7	78

[15] The three technologies considered are: use of selected seeds, use of fertilizers, and use of pesticides.

CHAPTER VIII

CONCLUSION

A summary of the findings and a brief discussion of the implications for the communication strategy were presented in Chapter II. Therefore, in this concluding chapter, it is possible to reflect a little on the developmental investigation itself. This was the first developmental investigation conducted in the CTTA Project, and the exercise has produced valuable experiences that can be used to improve those that will follow. Although there are several gains from the experiences, the ones that are more easily transferrable to other sites are the experiences of data collection, and it has been decided to focus on some of these very briefly.

This exercise has shown that some knowledge of agriculture is helpful in designing and conducting a developmental investigation desirous of obtaining information on farmers': socioeconomic and cultural characteristics; levels of knowledge and use of agricultural technologies; access to, and participation in supporting institutions. Knowledge of agriculture is invaluable in the development of the data collection instrument and the framing of questions. This is made clearer in the following examples which reflect some of the problems encountered in the developmental investigation:

1. With respect to seeds, it is not only important to know how much seed is used for a particular plot, it is also essential to find out which varieties are being planted. The quantities used per plot can be used to calculate seed rate, but seed rate is meaningless unless it is related to varieties since different varieties have different seed rates and different planting distances and as a result different plant densities.

2. With respect to fertilizing, it is not only important to know the type of fertilizers a farmer uses, it is also essential to know the quantities being used. Both types of information are needed to determine whether a farmer is supplying the required elements in the right amounts. To decide if a farmer is fertilizing correctly it would also be necessary to know about his application methods, i.e., what amounts of which fertilizers are applied when. By 'when' is meant the number of days relative to sowing.

3. With respect to prevention and control of pests and diseases, it is not only important to know the types of pesticides farmers are using, it is also necessary to ascertain the quantities being used and the pest or

disease for which they are being applied. Using insecticides for insect problems, fungicides for fungus problems, etc., also require that farmers be able to differentiate among insect symptoms, fungus symptoms, virus symptoms, bacterial symptoms, etc., and also be able to distinguish between insecticides and fungicides, etc. To determine if a farmer is practicing prevention and control correctly would require additional information on application methods: amounts of pesticides applied, when applied, number of applications, elapsed time between applications, etc.

The use of photographs of pests and diseases and labels of pesticides are useful during data collection in determining whether farmers can identify the problems they encountered, and also in facilitating collection of correct information on pesticides used.

Also, some useful experiences have been gained on certain variables related to measurements, for example, area cultivated, quantities of seeds planted, planting distances used, amount of pesticides applied, yields obtained, etc.

1. With respect to area cultivated, it is sometimes not difficult to obtain the correct information if the data on land owned or operated are available at village offices, etc. However, in most cases in developing countries such information is not available.

   In many of these cases, the farmers do not know the exact area cultivated on all their plots although most of them may have a fairly good idea. This is largely so because many plots have irregular boundaries, irregular shapes, slopes, and may be littered with stones, boulders, tree stumps, and fallen tree trunks. To compound the problem, farmers may be inter-cropping two or more crops on the same plot at the same time. To calculate the effective cultivated area would require estimating total area minus area not available on account of the above mentioned obstacles. This is often extremely difficult. As a result the data collected on areas is usually that given by the farmers. While verifying this information is possible it can be very time consuming and very costly. However verifying a sample of the areas would provide some estimate of the magnitude of the error.

   Farmers usually use indigenous measures and they should not be asked to convert indigenous measures to metric measures. This conversion can be made easily by the interviewers after some training.

2. With respect to planting distances, farmers may not be able to give exact distances, but they usually can indicate on the ground the approximate distances they have been using. It is advisable to let the interviewers carry tape measures so that distances indicated by the farmers may be measured correctly. Farmers may not be using any type of measuring instrument as a guide when planting; the distances they use, therefore, may vary within a narrow range. This has to be taken into consideration during the data analysis.

The above examples illustrate some areas in which inadequate data may inadvertently be collected. Several other areas can suffer from this problem if adequate thought and planning in the development of the data collection instrument are lacking.

Another useful experience may be found in the design of the developmental investigation. A relevant question would be "What generalizability is sought?" Another question may be "Will the developmental investigation data be used later for comparison, for example, with the formative evaluation data to obtain an interim idea of changes being produced in the target audience?" These questions would affect the sampling, location of data collection, and the nature of the data to be collected. For example, for generalizability it may be necessary to include, in the sample, farmers from the different ecological zones (physical, topographical and climatological differences); and for comparison it would be necessary to have some replication of questions in the formative evaluation.

These are only a few of the valuable experiences gained from this developmental investigation. It is hoped that this knowledge would be useful to others who are planning to conduct similar studies.

APPENDIX I

PESTS AND DISEASES OF CROPS IN PERU

APPLIED COMMUNICATION TECHNOLOGY

PESTS AND DISEASES OF CROPS IN PERU

Local Name	English Translation	Causative Agent	Prevention and Control Available?
POTATO			
1. Rancha	Leaf Blight	Fungus	Prev. & Ctrl. Ava.
2. Papakuru	Andean Weevil	Insect	Prev. & Ctrl. Ava.
3. Tocto	Bacterial Wilt	Bacteria	Prevention Ava.
CORN			
1. Gusano del Choclo	Corn Ear Worm	Insect	Prev. & Ctrl. Ava.
2. Gusano del Tierra	Root Worm	Insect	Prev. & Ctrl. Ava.
3. Polilla	Corn Weevil (Eat the grains of the corn)	Insect	Prev. & Ctrl. Ava.
WHEAT			
1. Roya	Rust	Virus	Prevention Ava.
2. Empaje	Empty or Partially Filled Seeds	Insect (Pulgon)	Prev. & Ctrl. Ava.
3. Polvillo	Mildew	Fungus	Prev. & Ctrl. Ava.

Prev. = Prevention; Ctrl. = Control.

APPENDIX II

QUESTIONNAIRE

COMUNICACION PARA LA TRANSFERENCIA DE TECNOLOGIA EN AGRICULTURA (CTTA)

INVESTIGACION DE BASE ENCUESTA INDIVIDUAL POBLACION

INSTRUMENTO Nº : _____

ENCUESTADORES : _____

LOCALIDAD : _____

FECHA : _____

_____

PRESENTACION, INICIO DEL DIALOGO
EXPLICAR: Somos estudiantes de la Universidad haciendo un trabajo de investigación para conocer mejor la realidad de los agricultores de Ancash.

_____

1. Sexo : 1 _____ Masculino
   2 _____ Femenino
2. Edad : _____ años
3. Grado de Educación:
   1. _____ Ninguno
   2. _____ Primaria
   3. _____ Secundaria
   4. _____ Superior o Técnica
4. ¿Cuántos son en su familia? _____
5. ¿Cuántas personas en su familia saben leer? _____
6. Tipo de propiedad de la tierra :
   1. _____ Comunero
   2. _____ Propietario Individual
   3. _____ Arrendatario
   4. _____ Otros (especifique) _____

CULTIVO	EXTENSION		MES SIEMBRA	CANTIDAD SEMILLA	DONDE CONSIGUE LA SEMILLA	MES DESHIERBO	MESES APORQUES	FERTILIZACION		INSECTICIDAS Y/O PESTICIDAS	MES COSECHA	CANTIDAD COSECHA
	RIEGO	SECANO						MES	TIPO			

ENCUESTADOR :

1. La cantidad de semilla puede ser en sacos, arrobas, cargas, kgs., T.M., etc
2. Donde consigue su semilla puede ser de una cosecha anterior, mercado, CIPA, etc
3. Para fertilización necesitamos saber CUANDO fertilizan y con que fertilizante; puede ser Urea, Nitrato de Amonio, Superfos, Simple, triple, Cloruro de Potasio, Guano de Isla, estiércol, etc.
4. Para los insecticidas y/o pesticidas, necesitamos saber cuáles son.

8. ¿Quién decide que es lo que va a sembrar?

1. _____ El Jefe de Familia
2. _____ La Familia
3. _____ Otro

8.a ¿Cómo lo decide?

1. _____ De acuerdo al tiempo
2. _____ Por consulta familiar
3. _____ Otros (especifique)

_____

_____

9. ¿Usa semilla seleccionada?

1. _____ Si (Pase a 9.a y b)
2. _____ NO (Pase a 9.e)

9.a ¿Porqué usa semilla seleccionada?

1. _____ Porque rinde mas
2. _____ Porque tiene mas garantía de germinación
3. _____ Porque no tiene enfermedades
4. _____ Otro (Especifique: _____)
5. _____ No sabe, no contesta

9.b Conseguir semilla seleccionada, para Ud. es:

1. _____ Fácil (pase a 9d)
2. _____ Dificil (Pase a 9c y d)

9.c ¿Porqué es dificil conseguir semilla seleccionada?

1. _____ Porque no hay
2. _____ Porque es muy cara
3. _____ Otro (Especifique: _____)

9.d ¿Para qué cultivos usa semilla seleccionada?

1. ____ Papa
2. ____ Maiz
3. ____ Trigo
4. ____ Todos los cultivos
5. ____ Otro (Especifique _____)

9.e ¿Porqué no usa semilla seleccionada?

1. ____ Por falta de dinero
2. ____ Porque no consigue
3. ____ Porque usa su propia semilla
4. ____ Por falta de conocimiento
5. ____ Por costumbre
6. ____ Otro (Especifique _____)

ENCUESTADOR: Ver pregunta 7 y para aquellos cultivos que no usa fertilizantes, preguntar:

10. ¿Porqué no utiliza fertilizantes para _____)

1. ____ Porque no necesitan
2. ____ Por falta de dinero
3. ____ Por falta de conocimientos técnicos
4. ____ Otros (Especifique _____)

ENCUESTADOR: Ver pregunta 7 y para aquellos cultivos que no usa pesticidas, preguntar:

11. ¿Porqué no usa pesticidas y/o insecticidas para _____?

1. ____ Porque no necesitan
2. ____ Por falta de dinero
3. ____ Por falta de conocimientos técnicos
4. ____ Por costumbre
5. ____ Otro (Especifique _____)

12. Destino de la producción : Ver cuadro 7)

PRODUCTO	CUANTO CONSUMIO	CUANTO VENDIO	DONDE VENDIO	SEMILLA

13. Cuando tiene problemas en sus cultivos ¿a quién le pide consejo?

1. _____ Técnico del CIPA
2. _____ Técnico del Ministerio de Agricultura
3. _____ Vendedores de productos agricolas
4. _____ Familiares
5. _____ Vecinos o amigos
6. _____ a nadie
7. _____ Otro (Especifique _____)

14. Para Ud. ¿Cuáles son los problemas mas importantes en el cultivo de PAPA? (Semilla, plagas, enfermedades, crédito, etc.)

1. _____ Rancha
2. _____ Papa kuru (Gorgojo de los Andes)
3. _____ Tocto (Marchitez Bacteriana)
4. _____ Enfermedades
5. _____ Plagas
6. _____ Clima (Sequia, helada)
7. _____ Semilla
8. _____ Falta de crédito o dinero
9. _____ Otro (Especifique _____)

15. Para Ud. ¿Cuáles son los problemas mas importantes en el cultivo de MAIZ? (Semilla, plagas, enfermedades, etc.)

1. _____ Gusano del choclo (Wisok o Helliothis)
2. _____ Gusano de tierra
3. _____ Polilla
4. _____ Enfermedades
5. _____ Plagas
6. _____ CLima (Sequia, helada)
7. _____ Semilla
8. _____ Falta de crédito o dinero
9. _____ Ningún problema

16 Para Ud. ¿Cuáles son los problemas mas importantes en el cultivo de TRIGO? (Semilla, plagas, enfermedades, etc.)

1. _____ Roya
2. _____ Polvillo negro o carbonera
3. _____ Empaje
4. _____ Enfermedades
5. _____ Plagas
6. _____ Clima (Sequia, helada)
7. _____ Semilla
8. _____ Falta de crédito o dinero
9. _____ Ningún problema

17. ¿Usa crédito del Banco?

1. _____ SI (Pase a 17a)
2. _____ NO (Pase a 17b)

17.a ¿Para qué cultivos?

1. _____ Papa
2. _____ Trigo
3. _____ Maíz
4. _____ Otro (Especifique _____)

17.b ¿Porqué no usa crédito del Banco?

1. _____ Por temor a no poder pagar
2. _____ Por tener poco terreno
3. _____ Por dificultades con trámite documentario
4. _____ No sabe o no conoce el trámite
5. _____ Porque no le ha interesado
6. _____ Porque no tiene documentos
7. _____ Otro (Especifique _____)

18. ¿Recibe Ud. algún tipo de asistencia técnica?

1. _____ SI (Pase a 18 a. b y c)
2. _____ NO (Pase a 18d)

18.a ¿Quién le da asistencia técnica?

1. _____ Técnico del CIPA
2. _____ Técnico del Banco Agrario
3. _____ Técnico Ministerio de Agricultura
4. _____ Otro (Especifique _____)

18.b ¿Qué tipo de asistencia técnica recibe?

1. _____ Visitas del técnico
2. _____ Parcelas demostrativas
3. _____ Con crédito
4. _____ Con insumos agrícolas
5. _____ Con remedios
6. _____ Jornadas demostrativas
7. _____ Consejos agrícolas
8. _____ Otro (Especifique _____

18.c ¿Hace cuánto tiempo que recibe asistencia técnica?

1. _____ Hace un año o menos
2. _____ Hace dos años
3. _____ Hace tres años
4. _____ Hace cuatro años
5. _____ Hace cinco años o mas

18.d ¿Porqué no recibe asistencia técnica?

1. _____ Porque no llega ningún técnico a asesorar
2. _____ Porque no sabe donde conseguirla
3. _____ Porque no necesita
4. _____ Porque no le interesa
5. _____ Otro (Especifique _____)

18.e ¿Cree Ud. que si recibiera asistencia técnica, mejorarían sus cultivos?

1. _____ SI
2. _____ NO (Pase a 19)

18.f ¿Porqué SI?

1. _____ Porque siguiendo indicaciones sembraríamos mejor y tener mas cosechas
2. _____ Porque el técnico conoce mas que uno
3. _____ Porque con explicaciones aprenderíamos
4. _____ Otro (Especifique _____

19. ¿Escucha Ud. Radio?

1. _____ SI (Pase a 19a y siguientes)
2. _____ NO (Pase a 20)

19.a ¿Qué radio-emisoras escucha mas? (Puede decir varias)

1. _____ Radio Ancash
2. _____ Radio Unión
3. _____ Radio Huaraz
4. _____ Radio Huascarán
5. _____ Otro

19.b De estas ¿Cuál es su preferida?

1. _____ Radio Ancash
2. _____ Radio Unión
3. _____ Otro

19.c ¿Porqué ? (Puede señalar varias)

1. _____ Por sus noticias
2. _____ Por su música
3. _____ Porque hablan en quechua
4. _____ Porque tiene mas potencia
5. _____ Por sus consejos para agricultura

19.d ¿A que horas escucha radio? (Puede señalar varias)

1. _____ de 4 a.m. a 5. a.m.
2. _____ de 5 a.m. a 6.a.m
3. _____ de 6. a.m. a 7. a.m.
4. _____ de 7.a.m. a 8.a.m.
5. _____ de 12 m. a 1. p.m.
6. _____ de 1. p.m. a 2. p.m.
7. _____ de 5 p.m. a 6. p.m
8. _____ de 6. p.m. a 7. p.m.
9. _____ de 7. p.m. a más
10. _____ cualquier hora
11. _____ Otro (Especifique _____

19.e ¿Qué programas de Radio escucha? (Puede señalar varios)

1. _____ Noticias
2. _____ Huaynos (Musicales)
3. _____ Amanecer Campesino (CIPA)
4. _____ Mensajes
5. _____ Sobre agricultura
6. _____ Otro (Especifique _____

19.f ¿De estos cuál es el que mas le gusta?

1. _____ Noticias
2. _____ Huaynos (Musicales)
3. _____ Amanecer Campesino
4. _____ Mensajes
5. _____ Sobre agricultura
6. _____ Otro (Especifique _____)

19.g ¿Porqué?

1. _____ Para informarse de lo que sucede
2. _____ Porque es en quechua
4. _____ Por su buena musica que alegra
3. _____ Porque da consejos para agricultura
5. _____ Otro (Especifique _____)

20. Si quisieramos enviarle consejos sobre agricultura por la radio ¿Qué radio-emisora deberiamos usar para que Ud. los pudiera escuchar?

1. _____ Radio Ancash
2. _____ Otro (Especifique: _____)
3. _____ No tiene radio

20.a ¿A qué hora deberíamos ponerlos?

1. _____ de 4. a.m. a 5. a.m.
2. _____ de 5. a.m. a 6.a.m.
3. _____ de 6. a.m. a 7. a.m.
4. _____ de 7. a.m. a 8. a.m.
5. _____ de 5. p.m. a 6. p.m.
6. _____ de 6. p.m. a 7. p.m.
7. _____ de 7. p.m. a más
8. _____ Otro (Especifique: _____)
9. _____ No sabe, no contesta

21. ¿Ha escuchado Ud. el programa del CIPA "Amanecer Campesino"?

1. _____ SI (Pase a 21a y b)
2. _____ NO (Pase a 22)

21.a ¿En que emisora lo ha escuchado?

1. _____ Radio Ancash
2. _____ Otro (o no sabe)

21.b ¿Qué sugiere para mejorarlo? (Puede señalar varios)

1. _____ Ampliarlo porque es muy corto
2. _____ Que explique mas lento
3. _____ que hable mas en quechua
4. _____ Mas consejos sobre agricultura
5. _____ Mas sobre plagas y enfermedades
6. _____ Mas sobre enfermedades de animales
7. _____ Mas música (huaynos)
8. _____ No sabe

22. ¿Que tipo de música es su preferida?

1. _____ Folklórica (huayno)
2. _____ Chicha
3. _____ Cumbia
4. _____ Cualquiera
5. _____ Otro (Especifique: _____

23. ¿Le gustan las revistas con dibujo o fotos?

1. _____ Dibujos
2. _____ Fotos
3. _____ Los dos
4. _____ Ninguno
5. _____ No sabe

24. ¿Quién cree Ud., que puede darle un mejor consejo sobre agricultura? (Debe preguntar las tres alternativas)

1.a _____ Los técnicos del CIPA (Pase a 2)
b _____ Los vendedores de insecticidas (Pase a 3)

2.a _____ Los técnicos del CIPA (Pase a 3)
b _____ Su vecino (Pase a 3)

3.a _____ Los vendedores de insecticidas (Pase a 2)
b. _____ Su vecino (Pase a 2)

25. ¿Viaja fuera de la Comunidad?

1. _____ SI (Pase a 25a y siguientes)
2. _____ NO (Pase a 25d)

25.a ¿A dónde?

1. _____ Huaraz
2. _____ Carhuaz
3. _____ Marcará
4. _____ Lima
5. _____ Costa
6. _____ Otro

25.b ¿Para qué viaja?

1. _____ A comprar alimentos
2. _____ A comprar productos agrícolas
3. _____ A vender productos
4. _____ A ver a la familia
5. _____ A trabajar
6. _____ Otro (Especifique: _____)

25.c ¿Con que frecuencia viaja?

1. _____ Cada semana
2. _____ Cada mes
3. _____ Cada dos meses o mas
4. _____ En cualquier momento
5. _____ Cuando tiene dinero
6. _____ Otro (Especifique: _____)

25.d ¿Por qué no viaja ?

1. _____ Porque no hay motivos
2. _____ Porque tiene que trabajar en la chacra
3. _____ Porque cuesta mucho el pasaje
4. _____ Otro (Especifique: _____)

26. ¿Ha ido alguna vez a pedir consejo al CIPA de Marcará?

1. _____ SI (Pase a 26a)
2. _____ NO (Pase a 26b)

26.a ¿Le atendieron?

1. _____ SI (Pase a 26c)
2. _____ NO (Pase a 27)

26.b ¿Por qué NO?

1. _____ Porque el técnico a veces no se encuentra
2. _____ Porque técnico va a comunidades
3. _____ Porque no sabe o no conoce que puede ir
4. _____ Por falta de costumbre
5. _____ Porque no tiene tiempo (el agricultor)
6. _____ Otro (Especifique _____)

~~26.c ¿Le atendieron?~~

~~1. _____ SI~~

~~2. _____ NO (Pase a 27)~~

26.d ¿Aplicó el consejo que le dieron?

1. _____ SI (Pase a 26 f)
2. _____ NO (Pase a 26e)

26.e ¿Porqué no lo aplicó?

1. _____ Falta de dinero para comprar productos
2. _____ Otro (Especifique: _____)

26.f ¿Le dió resultado el consejo que recibió?

1. _____ SI (Pase a 27)
2. _____ NO (Pase a 26g)

26.g ¿Por qué no?

_____

_____

_____

27. ¿Ha visto alguna parcela demostrativa del CIPA?

1. _____ SI (Pase a 27a)
2. _____ NO (Pase a 28)

27.a Cree Ud. que podría obtener los mismos resultados en su parcela?

1. _____ SI (Pase a 27b)
2. _____ NO (Pase a 27c)

27.b ¿Cómo?

1. _____ Con el apoyo y consejos técnicos
2. _____ Aplicando lo que ellos indican
3. _____ Sembrando a medias con el CIPA
4. _____ Si CIPA da lo que necesita
5. _____ Otro (Especifique: _____

27.c ¿Por qué no?

1. _____ Por falta de recursos
2. _____ Porque no le enseñan como obtener esos resultados
3. _____ Porque los agricultores no trabajan tecnicamente

28. ¿Cuáles son los trabajos que hace el Jefe de Familia?

1. _____ Agricultura
2. _____ Albañileria (construcción)
3. _____ Comercio
4. _____ Carpinteria
5. _____ Otro (Especifique: _____

29. ¿Cuáles son los trabajos que hace la mujer?

29.a En la casa:

1. _____ Cocina
2. _____ lavado
3. _____ cuida los hijos
4. _____ recoge leña
5. _____ Otros (Especifique: _____

29.b En la chacra:

1. _____ Deshierba
2. _____ Siembra
3. _____ Cosecha
4. _____ Desterronea
5. _____ Cuida animales
6. _____ Otros (Especifique: _____

29.c Otros trabajos

1. _____ Hilado y tejido
2. _____ Pastoreo
3. _____ Comercio
4. _____ Coser a máquina
5. _____ Otro (Especifique: _____

30. ¿Cuáles son los trabajos que hacen los hijos que dependen de la familia?

1. _____ Estudian
2. _____ Pastean animales
3. _____ Deshierbo
4. _____ Desterronean
5. _____ Siembra
6. _____ Cosecha
7. _____ Lavan
8. _____ Cocinan
9. _____ Otro (Especifique: _____

3 ayudan en la chacra

4 ayudan en la casa