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FINAL EVALUATION ON THE  
AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION PROJECT

REE/AID No. 527-0192

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## INTRODUCTION

The Final Evaluation on the Agricultural Research, Extension and Education Project - REE (USAID/PERU's Project No. 527-0192) was entrusted to us in May 1989.

From the very beginning, the conditions and resources available to prepare this evaluation (two people in six weeks, with difficulties in travelling), made it necessary for us to focus on this process with a particular form of approach, given that:

- The 19.5 million dollar project (USAID contribution) and its seven years' duration, created a fairly complex activity, since it went as far as involving up to 18 different programs and components, having been modified on 12 occasions and involved several institutions.

- The project laid the foundation for the converging support of other finance institutions, mainly the World Bank and the Interamerican Development Bank. In this way, a program was implemented under the one scheme for a final amount of approximately 120 million dollars. Because of the way the program was implemented, it is very difficult to separate the exclusive impact applicable to each donor.

- The attainment of the project's objectives, particularly insofar as institutional development is concerned, involved implicit factors in the structure of the country's public administration as well as other "non technical" factors. Therefore, achievements and deficiencies cannot be approached under the simple scheme of a comparison between the aims proposed and those attained.

For all the above reasons and the fact that there is an abundance of documentation containing technical information on the project from different organizations (A.I.D., ISNAR, NCSU, etc.) it was agreed with Agricultural/A.I.D. officials that we should focus on giving priority to the qualitative aspects rather than the quantitative, however worthy of merit the latter may be, methodologically giving privilege to interviews with participants in the project and searching for a type of document such as "lessons learned".

Underlying this approach is the hypothesis that the factors or elements that limited the attainment of more and better results, were not so much in the strictly technical area of the project, but in the field that we shall refer to as institutional, organizational, administrative.

We believe that this hypothesis has been amply confirmed throughout our work, enabling us to reach some clear conclusions in the majority of cases and making it possible for a number of recommendations to be given for the implementation of a project with similar objectives in Peru.

## EXECUTIVE SUMMARY

Agricultural research in Peru began with the creation of the National Agricultural School in 1902 (later to become the National Agrarian University of La Molina - UNA). Subsequently, a strong private sector established mainly on the Coast, carried out some scientific work through experimental stations, achieving crops of a high standard, aimed at exports. In the forties, a public research and extension system began to operate on a local scale, supported by international entities. Towards the end of the sixties, the country had available a Research, Extension and Education system that, in an openly biased manner, provided basic articulated agricultural technology.

The Agrarian Reform process and its consequent administration by the Military Government (1968 - 1979), changed the outlook of agrarian development. Development was based on giving priority to the process of land ownership redistribution, and the expansion of agricultural frontiers. The sector's growth strategy based on science and technology was practically abandoned, resulting in a loss of physical and human resources, which caused the extension system to disappear, research to be disregarded and agricultural education institutions to be neglected. Consequently, this policy and other factors such as the negative balance of trade generated extremely slow agricultural GDP growth rates (an average of 2% per annum) in a country where the farmland/man relationship is one of the lowest in the continent (0.35 has. per inhabitant).

In 1979, the Peruvian Government decided to re-establish the agrarian development scheme based on science and modern technology contributions, and created the INIAA (National Agricultural Research Institution). In 1980, supported by A.I.D. and the North Carolina State University, the "Research, Extension and Education Baseline Study" took place, with the contribution of 121 Peruvian specialists and 16 international experts. This study recommended the recomposition and recapitalization of Agricultural research, extension and education in Peru as a long term effort, with the essential support of international donors, emphasizing a strategy that basically included: a) operating a system comprising all three components; b) concentrating and giving priority to activities through national programs for main crops; and c) establishing a strong relationship with International Research Centers (IARCs).

The A.I.D.'s Research, Extension and Education Program (REE) signed in 1980 and implemented since 1982, was based on this study. The purpose of the project is to: a) consolidate a basic institutional scheme for the REE system and b) generate and transfer a continuous flow of various levels of agricultural technology aimed at small-scale domestic producers. The creation of five Domestic Production Programs was envisaged (Rice, Corn, potatoes, Small Grains, Grain Legumes) in five Regional Research Centers and other supporting programs such as the Education Program based on the UNA's Graduate Program.

The original A.I.D. project (US\$15 million) was increased when other donors joined the proposed scheme, such as the World Bank and the Interamerican Development Bank. In this way, through successive amendments, resources were

increased to a total of US\$120 million (including GOP amounts). The Peruvian Government accepted the REE System's integration concept and restructured INIAA, which became INIPA (National Research and Agricultural Promotion Institute), to include the extension component.

Probably due to the weakness of the private sector at the time the project was designed, this sector was not actively incorporated into the project, thus limiting it almost entirely to the influence of INIPA and the UNA. Therefore, great efforts had to be made to implement the project, facing a series of "non-technical" factors and the structural nature of Peru's public administration, which interfered with the implementation of the project's technical aspects. Among such factors were: a) the lack of sufficient autonomy on the part of INIPA; b) excessive political interference; c) rigid public administration standards; and d) exasperating institutional rivalry.

Despite the difficulties involved in facing the above mentioned factors and the distortions they generate, the REE project showed a decidedly positive balance seven years after its implementation. A good technical design, the commendable coordination of its donors, excellent technical assistance and the contribution and motivation of many Peruvian professionals, are among the features that made this positive balance possible.

A quantitative evaluation of the REE Project's impact on levels of production, productivity and agricultural income with respect to the resources used, implied methodological difficulties which the present study did not expect to solve. These difficulties basically refer to the fact that a) the contribution of the REE/AID project was not the only component comprising the amount of resources used in the REE system during the period under analysis; b) non-technological factors such as the handling of economic policies were possibly important elements that could serve to explain (together with technology) the evolution of the agrarian sector's productive variables; and c) agricultural research has long-term investment-recovery prospects (10 - 15 years).

Nevertheless, some indicators of the projects impact in the sector and its economic rationality should be pointed out: a) Agricultural GDP growth rates in Peru have shown a tendency to grow between 1980 and 1988 (2% per annum between 1970 and 1980, 3.9% between 1980 and 1985 and 4.8% between 1985 - 1988); b) The Ministry of Agriculture's official statistics show a growth evolution in the yields of products corresponding to the project's National Programs between 1980 and 1988, specially rice, corn, potatoes and wheat. These yields reveal a greater increase in areas related to PNP sites; c) The study carried out by Norton & Ganoza in 1986, making a prior evaluation of the return on research policies in Peru, shows average economic return rates of 17 to 35% for crops worked by the project, and d) The analysis made in 1987 by the North Carolina State University on the evaluation of technologies extended by the project, estimates the value of producers' profits on income to be US\$48 million, thanks to the adoption of such technologies only in that year.

In addition, specific achievements of the REE project have been clearly identified through the present evaluation and refer to: a) An acknowledged contribution to the provision of essential infrastructure and equipment to

recapitalize the REE system, b) The creation of the initial conceptual and financial basis which made the contribution of other donors possible, c) A significant and extended effort to train human resources, d) The generation of important improved varieties and complementary technological packets in National Programs, e) The possibility of INIPA's operation as an institution for seven years, through a permanent and flexible flow of financial resources, f) The establishment of important connections with international research centers, g) An important progress in the professionalism and institutionalization of agricultural research in Peru.

On the other hand, there were two clear voids, the responsibility of which lies in the project's design rather than in its implementation, but which possibly prevented a better achievement of the objectives: a) the absence of the private sector's active participation mechanisms; b) a weak role in the promotion and structure of the systems of multiplication and supply of improved seeds to producers.

Also, certain factors and circumstances within local institutions prevented a more efficient operation of the process of generating and transferring technology, mainly: a) the excessive turnover of INIPA Heads (approximate average duration of one year); b) low salary levels, inappropriate for retaining qualified manpower; c) the absence of a technical career system with the necessary incentives and promotions related to the personnel's qualifications, performances and experience; d) over-rating the administrative and geographical area and disregarding the technical aspects; e) a tendency to disseminate efforts without maintaining an adequate balance between aims and available resources.

Despite the successful technical handling of the REE project, certain aspects could probably have been improved if conditions had permitted: a) the insufficient attention given to the evaluation, follow-up and up-dating of transferred technologies; b) the poor level of coordination achieved between the system's member institutions; c) the relatively low integration level of research and extension activities, which left some voids in the transfer of information and know-how mechanisms between both components; d) the relatively unsuccessful adoption of the Training and Visits method for extension; e) the neglect of cattle-farming research; f) the low graduation levels of local masters (UNA) and the inadequate attention given to the training of extensionists; h) insufficient support to the sale of an institutional image and of the project; i) a poor persuasive capacity over INIPA insofar as important strategic and technical decisions are concerned.

Towards the end of the project, two factors that had a negative influence became more acute, and a third factor appeared which threatened the continuity of efforts aimed at the institutional construction of the REE system: a) the ever increasing economic/financial crisis in the country, affecting the flow of local resources to the system and the salary levels of technicians, causing the probable flight of qualified personnel; b) the growing subversive phenomenon, threatening job safety in many areas in the country; and c) the highly nontechnical restructurization that took place in 1987 which placed the extension component under the Ministry of Agriculture, making the newly formed INIAA responsible for research.

The lessons learned from the REE project are related to the important achievements obtained and the limitations and voids encountered, particularly: a) the fact that the experience of other countries insofar as agricultural development based on science and technology are concerned, shows that enormous possibilities are opened for obtaining sustained increases in levels of productivity and income for producers, was confirmed; b) the fact that a close and harmonious coordination between donors is essential, was verified; c) a correct approach to the project with respect to the operation of the agricultural research, extension and education program as an integrated system that concentrates and gives priority to activities, was confirmed; d) it was essential not to underestimate the structural characteristics of local public administration; e) the active participation of the private sector in the REE system, providing credibility, efficiency and continuity to the process, was essential; f) a stable manpower requirement, through realistic pay scales and effective recruitment and promotion mechanisms is important; g) close coordination between components and institutions in the system is important; h) more attention given to the follow-up, evaluation and updating mechanisms as well as to the transfer of know-how and experiences between researchers and extensionists, is necessary; i) build-up of a good institutional image and clear, persuasive mechanisms on the part of the donors when faced with the system's strategic decisions, is important.

## I. BACKGROUND

### a) State of the REE System at the start of the Project

Until the fifties, the Peruvian agricultural sector could only count on the National Agrarian University at La Molina (founded in 1902) and the activities of a small but powerful private sector as sources of agricultural technology, inclined towards export crops from the Coast. Since the forties, the public sector began its research and extension activities through programs inspired by American Research, Extension and Education Systems, supported by A.I.D., and since the sixties, with the technical assistance provided by the North Carolina State University. The private sector, through its demand for professionals, its experimental stations and its resources, contributed to the operation of a system of agricultural technology which is closely linked with the Agrarian University and with State entities. Thus, towards the end of the sixties, some 3,000 professionals were working in the field (farms), most of them trained at the university in La Molina. They were associated with the network of public and private experimental stations (mostly on the Coast). A local extension system thus operated on a national scale.

During the period the military government was in power (1968-1979), the Agrarian Reform carried out at that time dealt a strong blow to the existing system. Priority was given to the use of resources aimed at the expropriation and distribution of lands, research services were neglected and extension was abandoned. This process produced a general physical and human decapitalization of the sector insofar as research and extension were concerned.

Experimental stations were neglected and some of them dismantled; private stations were expropriated and a significant number of professionals abandoned

their activities connected with the generation and transfer of agricultural technology. Scorning the contributions of science and technology, the bulk of public investment was aimed at large irrigation projects on the Coast, with slow maturity prospects and a high cost per hectare. The development strategy of a form of agriculture based on science and technology was virtually abandoned. The Agrarian University's high academic and technical standards began to drop. In a country where the relationship of prospective farmland/man is extremely low (0.35 has) and with agricultural frontier expansion costs being very high, the results of such neglect were highly negative.

Consequently, during the 1968-79 period, the agricultural sector was strongly decapitalized in physical and human terms, and many years and much research material were lost. The private sector was considerably reduced and its contribution to the generation and transfer of technology practically disappeared.

During this period, the sector's average annual growth rate was 2%, well below the growth rate of the population, causing enormous deficits in food products, increasing imports and reducing exports.

However in 1979, recognizing the need to reassume the agricultural development strategy based on technology, the Government created the INIA (National Agricultural Research Institute).

The first job undertaken by the INIA, which was highly important, was to carry out a "Basic Study on the System of Agricultural Research, Education and Extension" (December 1979) with the assistance of AID/Peru and the North Carolina State University. This study considered the work done by 121 Peruvian professionals and 16 international experts.

The study evaluated the state of the country's agricultural research capacity, identified the main problems and proposed recommendations for the recomposition of the REE system with long-term prospects. In this way, the foundation was laid for USAID's REE Project No. 527-0192 signed in August 1980.

Various happenings prevented the immediate implementation of the project, which actually began towards the end of 1982 with the signing of the technical assistance contract with A.I.D. and with the North Carolina State University. Below is a summary of the main events that caused the delay:

1. The organization by the Peruvian Government of INIPA, the Agricultural Research and Promotion Institute, to replace INIA, on March 21st. 1981, which concentrated all public Research and Extension activities in a single entity. INIPA's regional mechanism consists of 23 CIPAS (Agricultural Research and Promotion Centers).
2. The signing of an agreement between the Peruvian Government and the IDB on May 15th 1981, to support INIPA.

3. The signing of an agreement between the Peruvian Government and the World Bank in 1982, to support INIPA, which began in 1983. (1/)

b) Objective and Rationality of the REE Project

The project's final objective is to increase the production and the income of the Peruvian rural population. The target group consists of "small-scale producers". According to the project, to achieve the socio-economic development of small scale farmers, depends on the technology and improved agricultural practices adopted. To achieve success, it is essential that a system exists whereby research, extension and education operate in an integral manner.

The project responds to a first stage of a broader, long-term strategy identified in the previously mentioned basic study. It is aimed at providing the institutional programmatic basis for any future activities that may be financed by the Peruvian Government, A.I.D. and other donor institutions in the future.

According to the Project's document, the purpose of the REE project is to "Create a system of Agricultural Research, Extension and Education (REE)" that will enable the institutions involved in Agricultural Research, Extension and Education to:

1. Increase agricultural production, establishing basic structures to improve and broaden the capacity of the manpower required for Agricultural Research, Extension and Education.
2. Provide a continuous flow of various levels of agricultural technology capable of satisfying the demand of small and medium scale farmers as well as that of associated companies.

At the end of the project, the following conditions would indicate the attainment of the REE Project's achievements:

(1) An REE agricultural system in operation, with activities coordinated by a permanent administrative unit, responsible for developing and transferring technological information aimed at increasing the production of the five products selected by the project for national programs, resulting in less imports and a more stable supply of basic food products for the urban population.

(2) The human resources that are necessary to implement a dynamic operation of the REE system, would be supplied and reinforced through the continuous training of the system's personnel.

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(1/) For further information on the initiation process of the REE Project see: Morris Whitaker et al, "Mid Term Evaluation of the USAID Research, Extension and Education Project in Peru", Lima, March 1984.

(3) The establishment of a flow of information between the REE system, International Agricultural Research Centers (IARCs) and American Universities, with a view to capitalizing on the agricultural technology developed in these organizations to be applied to Peruvian conditions.

(4) The GOP would considerably expand investments in technical and financial resources in the REE system.

The following are the specific achievements of results anticipated by the REE Project:

(1) Five domestic production programs (DPP) for the following products: rice, potato, corn, grain legumes and small grains (wheat and barley). DPPs should develop technological packages and transfer them to farmers.

(2) Six regional service laboratories providing analyses on soil, water and vegetable tissues.

(3) Five regional research centers supporting national production programs.

(4) A local research-supporting unit to complement the work of regional centers.

(5) An educational program.

(6) A local office for the REE system's management.

The original project signed in August 1980 considered the financing of US\$15,000,000 of which AID contributed \$11 million (\$2 million as a donation and \$9 million as a loan) and the PG a \$4 million item. The original duration was considered to be five years.

c) Amendments to the Project between 1981 - 9

Since 1981, a series of amendments were introduced into the Project (12 in total) permitting important financial changes to be made under the same initial concept, enabling the scope of the project to be extended.

- In 1981, an IDB project component in the amount of US\$ 4.9 million was directed at INIPA.

- In 1982, a World Bank project to strengthen the REE system was put into operation, amounting to US\$80 million (US\$40 million on loan and US\$40 million as a local matching fund).

- In 1982, Canada donated US\$2 million to be aimed at specific components of the REE system.

- In various amendments, A.I.D. increased the amount of its donation up to US\$10.650 million, which, added to the loan of US\$9.0 million, the PG amount of US\$5.5 million and the US\$8.458 generated by PL-480 for the project, result in an overall financing of US\$33 million/doubling the

project's initial volume of resources.

Also, with successive extensions, the final date of the REE/AID Project was finally established at 30th. June 1989.

These amendments, and the necessary coordination with the other donor institutions supporting the REE System, result in a greater implementation level of the overall project. The main programmatic changes include:

- The decision to link all five domestic production programs with the Regional Research Centers, using the CIPAS (Regional INIPA Headquarters) as a basic nucleus.
- Closer relationships with the IARCs than had been anticipated.
- Increasing PNPs from 5 to 7.
- The development of two domestic programs for productive systems in the mountain and jungle regions.
- The development of six supporting programs: Agroecology, Human Resources, Quantitative Analysis, Integrated Handling of Plagues, Genetic Resources and Soil and Water Handling.
- In general increased efforts for the REE System's physical and human recapitalization.
- A regional distribution to support the System's CIPAs between the World Bank (North) A.I.D. (Center and East) and the IDB (South).
- In this way, the specific results or achievements of the project pointed out in section b) above are modified, since:
  - Regional Research Centers increase in number and integrate 21 CIPAs, forming a part of the domestic production programs.
  - The National Research-Supporting Unit is replaced by integrated domestic development programs to handle plagues. Genetic resources and soil and water handling.
  - The REE System's national management unit is replaced by programs to support INIPA's administrative handling.

Consequently, the original project signed in 1980 for US\$15 million became a combined effort of various donors and of the GOP amount which reached US\$120 million, maintaining the basic structural features of the REE/AID Project, i.e. the development of an Integrated Research-Extension-Education System, focusing on domestic production programs aimed at the country's priority products in terms of its development strategy.

It should be noted that the modifications did not appear simultaneously, and in some cases there was a considerable delay in implementing the changes. On

the other hand, with the commendable coordination established between donors, with the distribution of geographical and technical supporting areas, it is not easy to separate the impacts and results obtained and assign them to the individual efforts of one donor. Furthermore, the GOP made investments and direct expenses in the REE System which increased the total value of the funds assigned to the System between 1981 and 1988, to US\$230.4 million.

These are only a few of the reasons which we believe justify the approach taken in this evaluation, which only refers to the results obtained by the REE/AID Project.

d) Conditioning Factors during the implementation of the REE Project.

The evaluation of the project must bear in mind the enormous financial and technical effort made to set up the Agricultural REE System in Peru, which was aimed at the Peruvian public sector's institutions and basically to strengthen INIPA, a State institution with a relative margin for decentralization in its strategic handling.

Therefore, despite the project's excellent technical design, based on the in-depth diagnosis carried out by 121 Peruvian professionals and 16 international experts, as mentioned above, and in spite of its programmatic approval by other prestigious donors such as the WB and the IDB, supported by the NCSU's technical assistance, the structural nature of the Peruvian public sector's administrative/institutional bodies prevented an appropriate implementation of the project. Because of this, certain voids became apparent which, in our opinion, altered the technical aspects and introduced non-technical variables, preventing a broader impact on production. What is even more dangerous, this could affect the system's future stability and continuity.

Below we shall try to illustrate the structural/institutional features that negatively interfered with the project's technical efforts to achieve its objectives.

(1) INIPA's Insufficient degree of Autonomy

In our opinion, and in the opinion of most of the people we interviewed, INIPA did not have a sufficient degree of autonomy to make the strategic decisions required for the development of the institution and the project insofar as better technical alternatives were concerned. The Central Government's interference, although logical and necessary, had the opposite to the desired effect. Thus, for example, the project's strategy clearly specifies that efforts should be concentrated on a few national programs and regional research centers (only five initially), to proceed with a gradual expansion in accordance with the results obtained.

In practice, because of the availability of more resources it is true, but above all due to strong pressures applied on INIPA by other central and/or local government bodies, it was decided to work with 24 experimental stations and 36 sub-stations, covering all departments.

Clearly, this caused efforts to be dispersed, altering the project's original concept. For example, in its study on agricultural research in Peru, ISNAR concluded in 1987 that it would have been sufficient to work with 12 stations representing as many ecological areas in the country. Adjustments to this distortion began in 1988, but the efficiency of the overall project's efforts had already been affected.

Another clear example of INIPA's lack of autonomy and the Central Government's exaggerated interference, is the fact that Management was constantly changing. In the seven years since the REE Project's implementation, six Managers succeeded one another and two provisional Heads were in office for long periods, which is an approximate average of one Head per year in INIPA.

This phenomenon, together with what we believe is an excessive amount of real authority and decision-making power at management levels, (which we shall analyse later on) resulted in an unstable environment which was transmitted downward through the ranks, clearly affecting some of the programs, initiated with much enthusiasm by one Manager, only to be discontinued by the next, at least insofar as motivation is concerned. The much criticized "short-termness" of Peruvian policies was thus consolidated. The stability and continuity required by any administrative activity, becomes even greater when dealing with research and transfer processes which usually have long-term results. Therefore we consider this constant change of management to be a negative factor, because of its impact on INIPA's technical programs. (We shall go further into this analysis in Chapter 6).

A final example of INIPA's lack of autonomy appears to be the acceptance of the method of training and visits for the extension component, which according to our interviews, was apparently considered a failure. Its implementation appears to have been imposed by decision-makers from outside the institution.

## (2) Excessive Political Interference in INIPA

This is a generalized problem in Peruvian public organizations and in the specific case of a technical institution such as INIPA, had negative consequences for the implementation of the REE Project.

As an example of such consequences, we could mention the inefficient personnel recruitment system. We understand that key technical positions such as the Directors of Experimental Stations or of the CIPAS, were appointed according to their political tendencies rather than their technical qualifications.

Also, particularly in extension services, the recruitment and selection of personnel, who in general terms contributed to the institution's excessive growth, appears to have been deficient. Various studies indicate that INIPA could have operated efficiently with 40/50% of its staff during its peak expansion period.

As an example of the combined result of factors (1) and (2), we must

also mention the restructuring that took place in 1987, whereby the Ministry of Agriculture decided to separate Research (to INIA) from extension services (Ministry of Agriculture).

It should be noted that amongst the people we interviewed - former Heads of INIPA, Research and Extension Directors, Consultants, Officials of donor entities, the researchers and extensionists themselves, and even farmers - not one of them declared that they understood the technical reasons to justify such a measure.

An interview with a high ranking official of the Ministry of Agriculture at the time such a decision was made, confirmed the absence of a serious technical study to support this process.

The best proof of the negative consequences of such antitechnical decisions, is the mediocre operation of the extension system after its separation. We must remember that coexistence between research and extension activities within the same decentralized institutional scheme, was proposed in the basic study mentioned above, prepared by the 121 Peruvian professionals most involved in the sector, and by 16 foreign experts. This had also been approved and sustained by A.I.D., WB, IDB and other minor donors, including the serious technical advice provided by the North Carolina State University. Furthermore, when the project was restructured, high ranking officials of INIPA informed us of their disapproval of this separation and their lack of knowledge of the reasons behind such a decision.

This dramatic example, which in our opinion endangers the achievements of seven years of combined efforts, is the most obvious proof of the weakness of a technical institution such as INIPA, faced with "non-technical" decisions made at higher levels of the Central Government's administrative bodies.

Finally, there followed a process of political influence within the employees' sector, resulting in strikes, some of which lasted several months, seriously affecting the research program and creating a conflictive environment within different personnel ranks. (The well-paid technical staff supported by the project were often severely criticized because of the supposedly high salaries they earned).

### (3) Rigid Standards in Peruvian Public Administration

INIPA (now INIA) is subject to the Central Government Administration's standard regulations, involving a series of rigid terms insofar as establishing a professional career is concerned, and remunerative mechanisms.

Thus for example, remunerative scales are the same as those of the Central Government, which makes levels in general extremely low with respect to not only the private sector, but other decentralized public entities, such as local universities, State banks or public companies (ECASA, ENCI). The latter are able to offer salaries up to three or four times higher for professionals with similar qualifications.

Another example of the consequences of the rigid standards mentioned

above consist in the inconsistency between training programs and the promotion system. The result is that many technically-trained people must move up to administrative positions as their only means of obtaining better pay.

Chapter 6 details the impacts of all the above in INIPA's technical work and its institutional framework. It should be mentioned however, that these limitations are extremely serious and that since 1986, when salaries have deteriorated constantly, the strength and institutional continuity of the REE System is threatened, despite the efforts made by the Project.

#### (4) Irregular Flow of Local Funds

The Peruvian Government's chronic budgetary difficulties and INIPA's strong dependence on such funds, prevented a sufficient and prompt flow of resources required to implement a detailed, well-planned program of operations.

This situation has persistently repeated itself, and we have been informed that with the exception of one year, Government funds were always delayed, altering the research programs, which should follow fixed agronomical timetables.

The problem is aggravated by the conditions established by International Donor Organizations, demanding that counterpart contributions be respected insofar as the disbursement of funds is concerned. This last difficulty was persistently evident during the life of the project, finally resulting in the World Bank's withdrawal from the Project at the end of 1987.

#### (5) Institutional Rivalry

Although this is a difficult factor to judge, evidently it has been clear and disturbing, acknowledged by various studies on the REE Project, particularly with respect to its local structure. The apparently ancestral rivalry, going back to periods before the Project was implemented, caused difficulties in the REE "System" in the way it was designed. Discrepancies between UNA and INIPA were particularly noticeable, with inconsistent coordination which resulted in a duplication of efforts in the field of research.

#### (6) Instability of Economic Policies

The absence of coherent, stable political schemes has been one of the factors limiting agricultural development in Peru for a long time. The REE System, in search of productive impacts, has not escaped the negative consequences of this problem.

During the life of the project, an important change of Government took place, consequently the guidelines of economic policies were also changed. From 1980 to mid 1985, the Government headed by Fernando Belaunde Terry (Accion Popular) was in power, and after that date, the Government of Alan Garcia Perez (Peruvian APRA).

The first Government's policies were aimed at the operation of a free

market economy; the second's towards a scheme of increased state intervention. However, under both administrations, economic policies were inconsistent. Consequently, important elements affecting the sector, such as rates of exchange, interest rates, price controls, subsidies, customs tariff levels and barriers, and available credit levels, varied considerably during the Project's duration, preventing the existence of a clear framework to encourage farmers to complement the REE System's efforts for development and the transfer of technology.

The exchange rate, for example, was handled liberally by the Accion Popular government, coming close to establishing a real rate of exchange, with daily devaluations. The Apra government, during its first two years, used a different criteria, which caused the exchange rate to fall way behind the real exchange rate value, particularly insofar as the differential exchange rates used for food imports were concerned. Consequently, the Project's much sought-after objective of decreasing food imports was sharply reverted by a policy which made agricultural imports extremely cheap and competitive.

Interest rates and credit policies were also handled differently. Although the Agrarian Bank's interest rates never reached a real positive value, they came close enough between 1984 and 1985.

However, due to the strong inflation and the demand for advanced payments, effective rates made it impossible for most farmers to resort to credit. Dr. Garcia's Government opted for generalized subsidy rates and even credits with zero interest rates for some regions. The impact on credit demands then became massive, but medium term consequences were that the Agrarian Bank (providing 90% of the sector's financing) could not recuperate borrowed capital values and gradually lost its capacity to grant credits. This problem has become more acute during the last agricultural season.

Prices and subsidies for agricultural producers were also handled differently. President Belaunde's Government tried to gradually dismantle the control scheme inherited from the Military Government, which had proved to be a subvention of the field for urban consumers. However, the process had its ups and downs. Alan Garcia implemented a program of sheltered prices for a series of crops, increasing the subsidy levels of others. Consequently, certain products such as rice and yellow corn reached permanently high-subsidy levels and the added advantage of being purchased by State entities (ECASA and ENCI), thus eliminating the much-feared sales risk of producers. It is not surprising, therefore, that these crops obtained the best impact and results within the REE Project's national production programs. For the same reason, other crops such as potatoes and grain legumes, that did not have similar subsidy mechanisms nor their purchase guaranteed at sheltered prices, had a lower degree of expansion in their levels of production and productivity.

Finally, we could mention that the rhythm of change in economic policy variables did not occur in the coordinated manner required by development and transfer of technology programs, despite the commendable efforts made by INIPA, thanks to the technical assistance of high-ranking Peruvian professionals provided by the NCSU from 1984 to 1986. (Agroeconomy Program).

## (7) The Disruptive Subversion Element

Since May 1980, when the subversive movement "Sendero Luminoso" (Shining Path) first made its public appearance in Ayacucho, in the south of the country, the area covered by terrorist activities has been constantly increasing, particularly affecting agricultural production areas in the Southern and Central regions of Peru, and the area referred to as "Ceja de Selva" (high jungle), where the greatest expansion of agricultural production took place during the eighties (Department of San Martin).

One of the basic subversive strategies consists of preventing the field from producing an excess of food products to supply cities and in this sense, farmers are threatened so that they produce only strictly essential crops for their subsistence, and agricultural engineers and technicians are confronted.

The growing consequences of this movement's actions are beginning to seriously affect development and transfer of technology activities, particularly over the last three years. Thus, many engineers and technicians from the agricultural sector have been physically eliminated, experimental stations destroyed and producers forced to limit their production.

The programs most affected by this phenomenon are the Sierra program (Andean crops) which has had to abandon some working areas, the Potato Program, whose staff in the Huancayo Station (Santa Ana) has been displaced, the Wheat Program, and Corn insofar as its Sierra crops component is concerned. Finally, in the department of San Martin, another subversive movement, the "Movimiento Revolucionario Tupac Amaru" (MRTA) has complicated the scene, together with the Shining Path/Drug traffickers alliance. It is evident that under these conditions and with the existing threat for some of the experimental stations, the progress of the REE System's activities has been considerably affected.

## II. OVERALL IMPACT

### a) Macroeconomic Variables

As mentioned previously, the REE Project was a technical and financial effort made by A.I.D. and the Peruvian Government, with the contribution of other donors, for the purpose of reconstructing and recapitalizing the agricultural Research, Extension and Education System in Peru. In accordance with the logical framework of the Project Paper (PP) the overall impact should have resulted in a higher growth rate of the agricultural sector and become evident through official statistics. (1/)

In this respect, we must remember that the A.I.D. Project represented only 11% of the total amount invested in the REE System in the 1980 - 1988 period. (2/)

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(1/) PP Agricultural Research, Extension and Education Project Paper, AID February 1980.

(2/) Final Draft Report on the REE Project in Peru 1981-88. NCSU, August 1989 Lima, Peru.

Also, as mentioned in the previous section, various factors interfered with the growth evolution of the Peruvian agricultural sector's production and foreign trade during the eighties. There is no doubt that the impact of the generation and transfer of technology must have significantly contributed to the positive evolution of annual growth rates, since it was one of the "new" elements in the sector's supporting public activities. Nevertheless, we must also bear in mind that in general terms, since 1980, macroeconomic policies have been less "anti-agrarian" than during the twelve previous years, which must also have contributed to the increased growth rate. A.I.D./Peru, through the APID Project, contributed to establishing a basis for the analysis and design of appropriate policies for the Peruvian agricultural sector.

In terms of the Agricultural Gross Domestic Product, the evolution of the sector's growth, according to the reports of the Peruvian Central Reserve Bank, gave the following results:

ANNUAL GROWTH RATE OF THE AGRICULTURAL GDP

(Accumulated Annual Average Growth)

Y E A R S	% PER ANNUM
1950 - 60	4.3
1960 - 70	2.0
1970 - 75	1.9
1975 - 80	- 2.4
1980 - 85	3.9 (5.4)*
1985 - 88	4.8

(\*) Average growth rate, assuming the absence of a drop in production in 1983 (-9.6%) caused by natural disasters (El Nino current) and that the rate for that year was the average for the period.

Source: BCR and OARD/AID Data Bank.

From the above chart it is evident that since 1980, a different growth period began for the agricultural sector. Despite the fact that in 1983 one of the century's worst climatic catastrophies since 1926 occurred (floods in the North and droughts in the South, owing to the erratic behavior of the Ni o Current, with a drop of 9.3% in the agricultural GDP); an average annual growth rate was achieved, which was significantly higher than the population increase amounting to 2.7% per annum and to the sector's previous growth tendencies (1970 - 80).

Insofar as the evolution of food imports is concerned, we confirm that it was very difficult to expect significant impacts, because macroeconomic policies do not favorite a complementary framework for agricultural productive prospects.

Besides the backward exchange rate policy in force since 1985 (which made imports cheaper), rice and hard yellow corn have been persistently protected with subsidies and guaranteed purchases by public entities, thus establishing different consumer patterns. (1/)

In this way, despite the fact that the production of hard yellow corn increased substantially since 1980 (over 10% per annum on average), total consumption increased at a faster pace, therefore imports increased and have become more stable in recent years.

Insofar as rice is concerned, because of the protection factors mentioned above, the substitution process (replacement of tuber consumption) became more pronounced, and consumer patterns were modified. In this way, besides facing the vegetative increase, local suppliers also had to satisfy the growing demand caused by greater per capita consumption.

Despite the explosive growth in production (expansion of areas and yield) between 1980 (420,000 MT) and 1986 (1,200,000 MT), rice imports did not actually disappear during the project's final years, although they did decrease.

Insofar as wheat is concerned, historically the country's level of satisfying demand has been deficient, establishing itself at meeting ten percent of the demand between 1970 and 1980. A slight recovery was evident during the eighties, despite the negative factor represented by grain donations and low international market price levels. However, towards the project's final years, it became evident that thanks to the guaranteed prices for local wheat, the purchases made by ENCI and the obligation of the mills to use an ever-increasing fixed percentage of local wheat, combined with the profits obtained from yields (results of the Wheat Research Program

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(1/) Rice consumption per capita increased to an average of 21.5 kg between 1970 and 1980, to 26 kg. between 1981 - 85 and the consumption of poultry (fed on corn-based feed) continued its strong upward trend between 1980 and 1987.

at INIPA and the UNA), there were good prospects for an increased production. This enabled a possible reduction of import levels to be considered, mainly due to the prices of wheat production on the Coast (4 to 5 MT/ha in Camana, 6 to 7 MT/ha in Majes, with REE varieties). FUNDETRIGO appeared under these circumstances:

A private foundation for developing local wheat production, using varieties obtained from the REE Project and promoting the development of seedbeds, which expects to achieve its aims to supply 35% of the local wheat demand for 1993.

b) Evolution of the Yields of Five Products supported by PNP'S

(1) RICE: The evolution of production levels (rice in the hull) was spectacular during the eighties. Average annual production between 1970 and 1980 was 526,000 MT/year, (having reached 586,000 in 1970), therefore showing a certain stagnation. After 1980, growth became constant, reaching 1,169,000 MT in 1987, i.e. 2.2 times the average for 1970 - 80 and 2.75 times the 1980 level. This growth is due to the increase of cultivated areas and increased yields. The average number of hectares was 124,000 has. between 1970 - 80 (94,000 in 1980) which doubled in 1984, reaching 248,500 has. (234,000 in 1987). (1/)

Average national yields, while showing a constant growth, did not have a spectacular overall growth (4,328 in 1980 to 4,651 in 1984 and 4,990 in 1987). However, if the evolution at a regional level is included, it is possible to find a pronounced increase in the average yields of the departments of Lambayeque, La Libertad, San Martin and Arequipa, where the INIPA's National Rice Program had its most important working centers. (Supported by the REE Project).

(2) CORN: National production of hard yellow corn shows a consistent increase since 1980, having reached the historical record of 703,600 MT in 1984 (299,000 in 1980).

As in the case of rice, the increased production of corn is due to the incentive provided by a guaranteed price and implicit subsidies. Also, this increase consists of increases of cultivated areas, especially in the Selva regions, and a slight increase in national average productivity. Nevertheless, the latter is hardly significant, since although it rose from 2,467 MT/ha (1980) to 2880 MT/ha (1977), it had already reached an average of 3020 in 1971. At a regional level, increases were more significant on the Central Coast (Lima and Ancash) and in the departments of La Libertad and Cajamarca.

The production of starchy corn, on the other hand, remained stagnant during the seventies, despite a slight increase in production levels since 1980. National production in 1985 was the same as that of 1972. Average national yields did not reflect important changes in productivity (1086 MT/ha

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(1/) Source: ONA - Statistical and Economic Analysis Center and OSE - MA.

in 1985, 1046 MT/ha in 1980 and 1069 MT/ha in 1976). As in the case of the previously mentioned products, sustained increases in productivity were evident in some departments, such as Cajamarca and Amazonas.

(3) POTATOES: National potato production levels have suffered a constant decrease since 1970 (1,929,000 MT) until 1980 (1,370,000 MT), showing a slight recovery after that year (1,462,000 MT - and 1,708,000 in 1987). As we shall point out in the section covering economic policies, potatoes did not receive the incentives given to corn, rice and wheat. Besides, they have suffered because of the elasticity of existing prices, and the process of substitution, affecting the demand for this tuber in favor of rice and flour. Consequently, the cultivated area has permanently decreased since 1970 and in 1984 for example, almost half of the number of hectares were cultivated, compared to 1971 (171,864 has in 1984 vs. 320,050 has in 1971).

Yields, however, increased significantly since 1980, reaching 8,510 MT/ha in 1984 and 8,900 MT/ha in 1988, i.e. 45% more than in 1970 (6,120 MT/ha). The most important growth was in the Central Sierra, where 1970 levels were almost doubled in 1984, particularly in the department of Junin. Significant growth rates are also evident in the traditionally low yields of the Southern Sierra (Puno, Cuzco, Apurimac), where from 4,700 MT/ha in 1970 they rose to 5,400 MT/ha in 1980 and 6,900 MT/ha in 1984.

Furthermore, on the Southern Coast, spectacularly high levels were reached (10,170 MT/ha in 1970, 13,700 in 1979 and 18,000 in 1984). The national record is still held by the department of Ica, with over 20,000 MT/ha since 1978.

It cannot be a coincidence that the most important increases have been obtained once again in the area and department where the National Potato Program and the International Potato Center's Experimental Station are located (Junin).

(4) WHEAT: The evolution of this cereal's production has permanently decreased since 1970 (125,400 MT) until 1980 (77,100 MT), recovering slightly towards 1984-85, being replaced by ever-increasing imports (90% of consumption), faced with smaller and smaller farming areas. A modest increase in yields has been evident since 1973 (890 MT/ha) reaching 1124 MT/ha in 1980, 1230 MT/ha in 1985 and 1380 MT/ha in 1988.

Since 1985, important varieties launched by INIPA, as well as improved technological packages, the availability of seeds, and a positive evolution of locally granted incentives (slightly subsidized guaranteed prices) have achieved important changes in production and productivity levels. Thus, yields in the departments of the Sierra are bordering 1,400 MT/ha, and levels reached on the Coast are significant, 3,500 - 4,000 MT/ha in Camana, and 6,000 - 7,000 MT/ha in Majes. (Wheat on the Coast was reintroduced by INIPA through the PNP, supported by REE).

(5) GRAIN LEGUMES: Difficulties in obtaining appropriate statistics prevent us from providing a clear picture of what has occurred in this line of crops. We must remember however, that in this case, unlike the previous

cases, we had no research basis to start from, since this was totally nonexistent in the seventies. New varieties launched in 1987 and 1988, with the extension system in crisis and seed reproduction problems, prevent the appearance of considerable impacts. The national average yield did not suffer gradual modifications between 1974 and 1985. It is hoped that the research work carried out between 1983 - 88 may provide statistics in the near future.

To sum up, it can be said that with the Peruvian Government's decision to return to agricultural development on an institutional basis based on science and technology in 1979 (with the creation of INIA), international aid began to flow at the start of 1982. Some national programs and other supporting programs were delayed considerable, despite the fact that research is a medium and long-term process with impact horizons of up to 10 to 15 years. In the Peruvian case, its effects on the consistent increase of average levels of almost all the crops corresponding to the PNPs of INIPA, supported by the REE Project, are evident. Official statistics provided by the Ministry of Agriculture, worked on by the ONA, show the important impact on regional and average productivity levels of rice, potatoes, yellow hard corn and wheat. These impacts are more evident in regions or areas where the headquarters of INIPA's national programs were established.

#### (c) Creation of the REE System

Science-based agricultural development involves a process of change which revolves around the adoption by farmers of scientifically developed and updated technologies, providing them with greater harvests and more income.

The design of the REE Project in 1980, was coherent as an attempt to integrate the Research, Extension and Education components in a single, scientifically based System. These components had already proved successful in other parts of the world, and had operated in one way or another in Peru for seven decades: i.e., a system that generates agricultural research, provides farmers with technological packages, and establishes systems of training for the personnel involved in research and extension processes.

This system requires the public sector's leadership. Nevertheless, technology is not only generated and transmitted through the public sector, but also through the private sector, through Seed producers, companies supplying machinery, merchants, processors of agricultural products, agrochemical firms, and lastly, farmers organizations.

As seen in the historical background, this system was developed first of all with its education and research components at the start of the century, and later, since the forties, with extension.

Possibly due to the fact that after the Agrarian Reform in 1980, the private sector was disrupted, it was not included in the REE proposal. At the same time, the University was included in such proposal, although it was not sufficiently integrated into the system. In keeping with the institutional situation at that time, it was probably felt that the risk should be avoided of disrupting the system by channelling resources to different institutions. Thus, the REE's human and economic resources, which could have been channelled

through a joint system including the universities and the private sector, were aimed at a single State institution. Under such circumstances, it was difficult to create a solid institutional system, because of the risks of political interference in technical decisions, bureaucracy and inter-institutional rivalry.

Consequently, the system was practically reduced to the development of a single institution: INIPA - which formed part of a sub-system for research and extension. According to the existing medium term reports (Whitaker et-al, ISNAR, NCSU), visits to experimental stations and intensive interviews with direct protagonists, institutional building objectives were achieved in some cases and not in others. Below is a summary of results:

Outstanding achievements:

1. A sufficient supply of equipment and part of the infrastructure required for INIPA's operation. This consisted of vehicles for working the fields, agricultural machinery, laboratory equipment required for research services supplied to farmers, training and data processing electronic equipment.
2. A significant effort to train INIPA's personnel through scholarships abroad and at the National Agrarian University at La Molina, short courses and national seminars, regional o local.
3. The generation of important varieties in national programs, specially rice, corn and potatoes, through an integrated national research network which was adopted by a considerable number of farmers.
4. Financing of the INIPA sub-system through the supply of basic funds for its operation.
5. The establishment of important coordination links with international agricultural research centers.

The following objectives were not achieved:

1. Insufficient inter-relations between research and extension, despite the fact these components formed part of the same institution. Unfortunately this resulted in both services being separated into different institutions.
2. Frequent management changes which did not permit research and extension policies to have the necessary continuity.
3. Excessive attention to the number of experimental stations causing efforts to be dispersed, which could have been concentrated in selected agro-ecological areas or pilot stations.
4. Although not an explicit objective in the initial design, there was a lack of participation mechanisms for producers and for other groups from the private sector, which would have strengthened the institutional

building of the sub-system.

5. Negative consequences of low-salary institutional policies, and the lack of material or other incentives which did not encourage personnel stability in the sub-system.
6. Contradictory hierarchy policies and salary compensation for administrative posts in detriment of technical positions, in a mostly technical institution.
7. Poor integration with other institutions in the public sector and the absence of a management council of institutions participating in the system.
8. Little attention to follow-up mechanisms and to the evaluation of various components of INIPA's sub-system which would have ensured more feedback and credibility.
9. The absence of a solid method of technical appointments, evaluations and promotions which would have made INIPA more efficient and provided more continuity.

All this made the fragility of INIPA's sub-system evident, and prevented the formation of a solid institutional building with sufficient autonomy to face higher level political decisions.

Faced with such a situation, more emphasis should probably have been placed on the operation of the REE System's Administrative Units, envisaged in the 1980 proposal, which should have included a Board of Directors with representatives of all participating sectors.

Due to the volume of funds involved and because of the agreements signed for the implementation of a system that was mostly technical, A.I.D. could possibly have made more use of its negotiating capacity and powers of conviction. More details on these institutional aspects of the project are included under Chapter VI.

### III. RESEARCH AND SUPPORTING PROGRAMS

The purpose of the Project was to build a research system comprising five Regional Research Centers, one National Research Supporting Unit in addition to the six Regional Service Laboratories. The sites of these Regional Centers should serve to apply research to soil handling, irrigation, drainage and plant production, and to supply information to five national programs by products.

The National Research Supporting Unit should provide information on genetics, phytopathology, entomology and how to handle natural resources, and carry out research beyond the capacity of regional centers and on other products aimed at expanding national programs. They should also coordinate inter-regional transfer of information.

After obtaining the financial support of two international organizations - the World Bank and the Interamerican Development Bank - the Peruvian donation, loan and counterpart funds rose from 15 million to 120 million dollars. This obviously brought about some important changes: the implementation of the project was delayed for nearly a year, the geographical coverage of the project was expanded on a national scale, and some of the REE Project's components were either abandoned or neglected, whereas others were modified or expanded. In this way, the original REE project became a unitarian program on a national scale.

The above involved the physical integration of National Programs, Regional Research Centers and Regional Service Laboratories within 21 Agricultural Research and Promotion Centers (CIPAs). Thus, research for national programs, extension and in some cases, components of regional laboratories and Regional Research Centers, became integrated. Funds provided by each international financial organization helped with equipment, vehicles, operative funds, salary supplements and the training of a group of CIPAs. These funds were channelled through INIPA's Main Office in Lima. The REE was responsible for the CIPAs in the North and South East (Iquitos, Yurimaguas, Tarapoto and Puerto Maldonado) and in the Central region (Lima, Huancayo and Ica).

Instead of emphasis being placed on the five Research Centers proposed in the initial REE Project, and apparently as a consequence of the dispersion in 18 CIPAs it was not possible to implement the Research Supporting Unit that would gather experts in entomology, phytopathology and genetics. Similarly, differences in the roles corresponding to UNA and the project were not defined, consequently the coordination program with this institution was not given much importance.

In addition, three new national programs emerged, aimed at systems rather than at the development of a single product. These were the Selva Program, the Sierra Program and the Agro-economy Program. Programs for Genetic Resources, Integral Crop Protection and Water and Soils, also began to be implemented.

The System's research activities involved five programs for the following crops: rice, corn, potatoes, grain legumes and cereals. In fact, the modified project placed more emphasis on research than on extension, and even less on education. An estimate of the financial resources assigned between 1981 and 1988 (NCSU, Final Draft Report ... p. 11) calculates that 37% of the funds were directly dedicated to research. In addition, research was strengthened by part of the amount spent on administration and education.

It was envisaged that at the end of the Project, production of the five selected food products would increase, imports would decrease and a stable supply of basic food products for urban populations would be ensured.

Some highlights of the achievements obtained by the five crops in the national programs, are described below:

- a) Rice.- This is the crop that achieved the best results insofar as

research is concerned, as several varieties with very good agronomical features were developed, particularly in the Selva - an area which significantly increased its rice production over the last 15 years.

Rice has traditionally received preferential treatment in terms of price policies, marketing, research and imports, when necessary, due to the fact that it is considered of political importance, being a top priority food product for urban populations.

Despite the fact that it is not the most recommended agro-ecological area, rice has historically been cultivated on the Northern Coast, where it was supported by the Vista Florida Experimental Stations at Lambayeque.

Since the last decade, rice plantations have been the protagonists of a technological and socio-economic phenomenon with much relevance in Peru. Hundreds of migrants from the Sierra, workers on the irrigation estates on the Northern Coast, have settled successfully on the flat lands of the Upper Selva in San Martin. There, Experimental Stations at New Cajamarca in the Alto Mayo and Porvenir in the Central Huallaga, have introduced varieties such as PA 2, CICA 8, CICA 9, Porvenir 86, San Martin 86, Alto Mayo 88 and the 5009 variety will be launched this year. These varieties are generally well accepted among farmers with irrigated lands. Nevertheless, 70 - 80% of the farmers own hillside plots and have not developed dry-land varieties as yet.

A major problem is the fact that no technological packages exist for the majority of unweeded lands, except for corn, which shall be dealt with below. Other problems, such as the treatment of acid soils and weed control, still receive very little attention. For example, a recent experience was the proving stage of acid soils between farmers, which was not promoted due to lack of funds for acquiring phosphorous rock. Weeds have become one of the major problems, aggravated by the fact that laborers have moved on to the far more profitable coca plantations. Direct sowing could be a labor-saving alternative, although weeds increase. The herbicide required to combat weeds frequently cannot be used due to the small-scale farmer's lack of funds. The local Rice-Growing Committee (CNPA) has just sponsored the publication of a leaflet to publicize direct sowing of rice in the Selva. As part of the producer sector's increased participation, CNPA has created two prizes for the best research work on the Coast and in the Selva and is firmly supporting the production of basic seeds on farmer's lands.

b) Corn.- This is another considerable successful national program insofar as research is concerned, although not as successful as rice. This program also worked on two sites: one for starchy corn in Cajamarca and the other for hard yellow corn in Tarapoto's El Porvenir station. Similarly, considerable technical assistance was received, as in the case of CIMMYT, and a large number of researchers were sent to Mexico for training.

With the genetic material obtained from CIMMYT in 1984, a new variety of hard yellow corn was obtained: the Tropical La Marginal 28, which was well accepted in the North Eastern Upper Selva. Corn therefore became the "cash crop" of small scale farmers, particularly of migrants and settlers of new hillside lands who practice the itinerant "spray and burn" type of

agriculture. Some specialists are disturbed by this method, which they consider to be a predatory form of agriculture. They maintain that in the tropics, agriculture should not be sustained by single crops, much less by annual crops, that break up the agro-ecological cycle of several crops which together preserve the soil, making it more profitable; therefore perennial crops such as fruit trees should be considered.

Because of this, they indicate that corn should be a provisional crop and should be replaced by other, more permanent crops, as occurred in the Central Selva. They confirm that the State, which guarantees the purchase, price, credit and technology for rice and corn, has sponsored the promotion of native crops such as bananas, yuca and beans, and also cattle raising.

The early Coste o 36 variety was developed on the Coast. Among starchy corn varieties, the early Choclero 101 and Canchero 301 stand out, the late variety Canchero 401 and a hard variety Morocho 501 that is promoted in the Sierra. These varieties had their impact, but in small areas close to experimental stations.

Nevertheless, a seed producing system was not obtained. A more solid institutional system was lacking. Despite the fact that a good team of professionals was formed, there was no personnel stability. Inconsistently, because of salaries, several already trained professionals joined other State institutions such as ENCI and ECASA.

The change from genetic seed to basic seed is fragile, and personnel continuity is essential to guarantee conditions of security. Such conditions, although mainly limited to the Coast and Central Sierra, have already been offered at the National Agrarian University at La Molina's Corn Program since the fifties. However, the INIPA corn program had little, if any, coordination with UNA.

Seed production and distribution is a great challenge, requiring many producers. Existing producer committees tend to belong to political unions that try to raise controlled prices rather than to lower costs, through seed and fertilizer services, for example.

One achievement of INIPA's National Corn Program was its Personnel Training Plan, both national courses and in the CIMMYT in Mexico. Local courses placed emphasis on the establishment of ecosystems, and the definition of varieties and research methodologies.

Nevertheless, there were certain voids in the research programs which could have been avoided, for example, offering corn samples at stations when the farmer was at his busiest, instead of offering alternatives during busy periods.

c) Potatoes.- Most of the farmers who grow potatoes have a preference for this crop, despite the fact that it occupies the fifth place with respect to the number of hectares cultivated, according to the National Rural Household Survey (ENAHHR) in 1984. 89% of the cultivated surface is grown under rain and only 11% under irrigation. Potatoes therefore, are mainly a small-farmer crop, with high self-consumption ratios.

The same survey indicates that whereas 91% of the rice production is marketed, only one third of the potatoes produced are marketed. These potatoes, demanded by urban centers, are mainly of the following varieties: white, smooth, watery, relatively large and of a poor culinary quality.

One achievement worth mentioning, is that the National Potato Program was one of the most well-organized and well-implemented Programs through its headquarters in Huancayo. The three varieties worth mentioning were La Perricholi and Maria Huanca, resistant to Phytophthora and nematodes respectively, and Andina, very well accepted in Puno. However, as one expert suggested, the main problem does not lie in the varieties, as Peru has shown genetic prospects and practical experience in many varieties since the fifties, i.e. virus-free varieties. Potato production problems are found in the system's administration and in negotiating with producers and producer associations; in other words, with respect to truthful and prompt information on prices, supplies, cultivated areas, harvest times, etc. and on import policies, prices and on subsidies of other substitute products such as wheat or rice. "It would be sufficient to reduce these products for five or six years to increase the potato production" suggests a technician from the IPC.

It must be considered therefore that unlike Rice, Wheat and Corn, Potato production and a productivity are not directly influenced by macro-economic protectionist policies.

As in the programs for other crops, a basic problem insofar as potatoes are concerned, is the development of seed production and distribution. Neither INIPA nor farmers have been able to form a solid seed program. The Ministry of Agriculture is responsible for certifying the seeds, but it only has four inspectors for 3,500 has. of seeds.

It has been suggested that a viable alternative for the seed problem of various producers, would be for the present INIPA to assume the task of producing basic seeds, as it has infrastructure facilities and the know-how required, and as it would be a very profitable activity. The problem is one of political decision and administrative performance.

The National Potato Program joined the resources from various sources and obtained the utmost advantage from training at the UNA of masters in entomology, phytotechnics and phytopathology, which made it easier for students to finish their thesis. The IPC cooperated by providing trips and other promotions and incentives.

d) Small Grains (Wheat).- The program began in 1984. Since then, old varieties have been reviewed and cleaned and technological packages have been introduced, 1 triticale and two barley, and 10 new varieties of these food crops are being worked on.

The cereal production in Peru is an old problem, because of the increased urban population resulting from the high demographic growth rates and the peasant migration to cities. Faced with the need for more food for its growing urban population, Peru had to resort to imports. Food imports were stimulated by the program of distribution of agricultural surpluses

adopted by the North American Government since the fifties, through Public Law 480.

Thus, the State and the agro-food industry encouraged the population to consume wheat, with incentives such as subsidies and changing consumer patterns. This was an alternative solution for the growing deficits and popular discontent, under the argument that Peru was an inefficient wheat producer compared to other countries, a disadvantage which could be compensated with the advantages provided by other export crops.

During the four five-year periods between 1955 and 1975, Peru's average wheat production per capita decreased by 18.8, 14.6, 13.5, 10.2 and 8.9 kg/person respectively.

When INIPA's Cereals Program began its research work in 1984-85, there was a generalized preoccupation as to whether Peru had a comparative advantage for producing its own wheat. In 1985, Peru imported 266,520 MT of wheat and now imports have reached almost 1,000,000 MT at 230 dollars per MT. However, REE Project studies indicate that the low wheat levels produced in Peru are due to price policies and the lack of research and extension activities. Varieties which had been launched ten to fifteen years before, were not genetically maintained pure, or were not replaced, resulting in poor quality seeds.

Since 1984 - 85, the program has focused its attention on the production samples and fungus-resistance of over 5,000 lines of imported wheat and barley in different parts of the Sierra, on the production of certified seeds of improved varieties for the Coast and the Sierra, and on Weed Control. The latter was identified as one of the factors limiting an increased production.

INIPA's wheat program was a result of the new Government policy to increase the basic wheat price, and of a new law which demands that the agro-industry should use 10% of the grains produced in the country. A program of artificial inoculation against diseases began, to enable a faster control of germplasm lines.

The most successful varieties of wheat developed by the project, were Taray 85 Pachacutec 85 (for Southern Sierra). The purification of improved varieties, recovered such varieties as Ollanta, Cahuide, Gavilan and Molina 82, among others. Insofar as agronomic practices are concerned, important achievements have been obtained with respect to fertilizer handling.

Yields obtained at farmer level towards 1988 are fairly satisfactory. In the Northern Sierra, yields of 1.4 MT/ha. have been obtained, and in the south they have reached spectacular levels (under irrigation): 3.5 to 4.2 MT/ha. in Camana, and between 6 and 7 MT/ha. in Majes. Wheat was replanted on the Coast through the efforts of the respective PNP, and extension prospects in cultivated areas was very encouraging, where consistent increases have been estimated in the productivity levels for the next few years, according to FUNDETRIGO, which could satisfy 35% of the local demand in 1993.

At the same time, the UNA's Winter Wheat Program made progress with its research work on a winter variety, and has presented a proposal that is being studied at the FAO to introduce this variety, possibly on a million hectares in the Peruvian Upper Sierra. It would be advisable for these two initiatives not to remain as isolated and uncoordinated efforts, since a private institution such as FUNDETRIGO is also very interested in developing national wheat. We believe there are possibilities to create a coordinated inter-institutional wheat policy between the following key sectors: the State, the University and the Private Sector.

e) Grain Legumes.- The National Program for Grain Legumes is one of the most recent. Unlike other crops, research on Grain Legumes was discontinued during the seventies. The development of agricultural research is a process that requires persistence, and grain legumes are an example of what occurs when there is institutional instability.

The research center for grain legumes is located at the Experimental Station in Chincha. In 1985, the Blanco Chinchano variety was obtained, but because of the impurity of its color and its small size, it was not well accepted - two reasons why merchants lowered their prices.

A new variety has emerged this year - Blanco Laran - which is becoming well accepted by some farmers. It has some convincing advantages: it tastes good, it is virus and rust - resistant, it is more precocious and therefore requires fewer fungicide applications, resulting in lower costs, and furthermore, it can be associated with cotton without interfering with mechanization.

There has also been some significant genetic progress with the results of 14 advanced lines, four of them in virus and rust resistant testing plots, where it is expected that two new varieties will be obtained in 1990, one being a spring variety. In addition, there are about twenty nematode-proof varieties, and others that are tolerant to droughts and rot. According to the person in charge of research work on beans in Chincha, there is enough genoplasm for the next forty years. Non-genetic research experiments are also taking place, with the incorporation in the soil of organic matter pertaining to corn, sorghum or oats which will lower rotting levels, by competing against diseases, and therefore save on fungicides and enrich the soil.

However, this progress is very fragile, compared to the economic crisis, which has aggravated the incongruence of the system of evaluations, promotions and remunerations. The morale of researchers is very low at present. Most likely several of them will resign soon, and what is even worse, there is nobody sufficiently qualified to replace them and continue with the research work. Researchers complain about the extremely low salaries they earn despite their years of service (50 dollars after 10 years, for example); the superficial evaluations which do not take into consideration the results of such research work; the lack of incentives; the shortage of reference magazines, refreshments and transport for contracted personnel, despite the fact that funds are provided by ATT; and the non application of

Rule 4916 (which stipulates 15 salaries), and so on.

Other reports indicate the establishment of a national system for experimental stations, the treatment of estates and of the new varieties launched and widely accepted, which we have not tested as yet. Nevertheless, in Tarapoto we were shown that although farmers are willing to grow beans, there are no seeds, therefore the production of bean seeds, and other crops, is a problem that needs to be solved. It was also made evident that summer varieties should be offered on the Northern Coast, breaking the tradition of sowing beans in winter, when farmers are busy with other more profitable crops.

f) National Sierra Program.- The Sierra and Selva programs emerged, based on the idea of introducing the Production Systems concept. In 1984, a basic National System was established and in mid 1985, the Sierra Program emerged.

The objectives of the Sierra Program were to identify and evaluate the Production Systems, indicate the factors that limited production, identify, evaluate, adapt and transfer appropriate technologies to local conditions, and to train professionals and farmers. Methodologically, this program was conceived with the idea of implementing national programs by products, becoming aware of how the systems worked and offering alternatives in the field, although priorities were still not known.

- Significant progress was made in generating a germplasm bank for native products such as canihua, sour potatoes, quinoa, oca, olluco, tarwi, mashua and kiwicha. Subsequently the extension of their seed-beds was permitted.

- A group of qualified professionals were trained to focus on four Systems courses.

- A program to recover native technology was initiated e.g. "camellones" (wide and tall furrows) in Puno.

- Sixty communities have been influenced to become organized to produce seeds, store inputs and provide other services.

g) Selva Program.- This program began in 1985, during which the budget was cut due to the non-payment of the foreign debt. However, experience was gained from other programs. Unlike these, the Selva Program was not created to emphasize a crop, but rather to develop crop systems.

The Peruvian Selva is the largest natural region in Peru, covering 61% of the local territory. It is the least inhabited region, however before it is developed, certain myths must be broken, such as its wealth and potential as a food larder; and much more care should be given to maintaining the balance of its delicate ecosystem.

As was to be expected, there have been no substantial achievements yet, due to the short time since the Selva Program was implemented and since it is aimed at perennial species. There has been some progress insofar as

nurseries, seed beds, special germination chambers, meristema laboratories, "live" germplasm banks are concerned, among others. Experiments have been carried out in five stations: Yurimaguas, Iquitos, Pucallpa, Tarapoto-Moyobamba, and Pichinaque. The most well-equipped, well financed and well staffed, is Yurimaguas. Experiments are organized by projects: fruit, commercial, soils, industrial crops and native fruits.

Further progress made so far, includes the development of some production systems to test varieties of coffee, achiote and yuca, acid soil handling and some experiments with commercial crops (citrus fruits and pineapples).

With the economic and technical support provided by the REE Project, both the Selva and Sierra Programs have made efforts to join multiple financing from different sources, such as CIID, EEC, IAP, IICA, etc. to create a complementary technical and administrative basis.

The guidelines of these two programs by systems, are a technical progress for the treatment of the complex ecosystem of these two geographical areas in Peru. However, as has been clearly established in this document, the significant efforts and technical progress made, are frequently neutralized or diminished by incoherent political and administrative decisions. For example, at the present time, Law No. 24994: "Basis for the Rural Development of the Peruvian Amazon Region" issued last January, is threatening the future development of the Selva. According to specialists, (1/) the law was issued without consulting any technicians or experts from the sectors directly involved, totally disregarding the region's highly heterogeneous ecosystem, the balance between its forest, waters and soils; and the interdependence between its flora and fauna. Legal mandates are thus mistakenly established, disregarding native settlements, Production Systems, and giving priority to cattle-raising and agricultural activities that include the destruction of tropical forests and promoting the Andean migratory flow which has proved a failure for the past 30 years.

h) Research Program for Integrated Crop Protection (PROINPIC). The program referred to as the Integrated Pest Program under the original REE Project, was implemented in 1987 with the above name. PROINPIC's purpose is to develop integrated crop protection systems to support National Programs for crops to: a) increase agricultural production and productivity and b) avoid the negative effect of pesticides on agricultural ecosystems, on the environment and on human welfare.

During 1987, the team in charge dedicated itself to organizing the Program in five areas where specialists were already established: La Molina in Lima, Vista Florida in Chiclayo, Santa Ana in Huancayo, Andenes in Cuzco and El Porvenir in Tarapoto. Priority was given to phytopest in each area and

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(1/) Brack, A. (1989), De Achille (1989).

information was obtained on the experiences gained in the country. The recommendations resulting from the "Discussions on PROINPIC's Priority Research Work" held in Chiclayo, were very useful. Preliminary packages were formed for the integral control of potatoes, corn, rice and beans on the Coast and potatoes and corn in the Sierra.

The subsequent strategy included:

1. The establishment of priority, medium-term research lines.
2. The preparation of research projects by regional teams.
3. Initial research of priority lines for the readjustment or validation of preliminary packages.
4. Personnel training.

Using the recommendations of the Chiclayo Discussions as a basis, management team members visited regional headquarters to establish projects, methodologies and budgets issued in 1988, which will continue in 1989. 110 were approved in 9 research lines: Dynamics and Epidemiology (25), year and rudimentary economic levels (18), biological control (24), variety resistance (12), diagnosis (10), validation plots (9), cultural control (5), chemical control (4) and biological habits (3).

Actions were extended to Chincha, Puno and Cajamarca and because of non compliance on the part of the El Porvenir personnel, it is being replaced by Jaen-Bagua.

As regards training, a course on "Integrated Plague Control" was held in Lima, with professors from the Universidad Nacional Agraria, but the course on "Methodologies for Determining Levels of Damage and Economic Thresholds of Phytopests" was postponed and its site was changed to another location. Because of the advantages it offers, especially insofar as educational material is concerned, this course will probably take place in the Panamerican Agricultural School in Honduras.

There are also some institutional advantages. Relationships with teachers of regional universities have become more intense, the Andean Potato Research Program (PRACIPA) financially supports research work in Huancayo, Cuzco, Puno and Ca etc, and relations have been established with the Peru-Germany Cooperative Project for Andean Crops (COPACA) and Corde-Cuzco.

Naturally there are also problems or difficulties, mainly:

1. Researchers of National Programs by Crops are still not sufficiently aware of the need for PROINPIC. One person interviewed indicated that a certain amount of jealousy existed between them, because they believe their lines are being taken away. However, researchers of a product in one Experimental Station say that the PROINPIC people do not know how to work the equipment and they continue with isolated, (non-integrated) lines for phytopathologists and entomologists. "There are more difficulties" - said one

PROINPIC Researcher - "in horizontal programs".

2. They still do not have an official document defining the structure and functions of leading lines and the relationships with the institution's other bodies.

3. In the short time since its attempt at consolidation, strikes have caused crop delays.

4. The task is not an easy one: they are faced with the competition of commercial houses selling insecticides, that influence PROINPIC's objectives.

5. Frequent delays in the transfer of funds affect harvests.

6. Low salaries cause personnel to leave the institution and furthermore, sometimes the position is lost.

i) National Genetic Resources Program (PRONARGEN): This began in 1987 for the purpose of collecting, preserving, introducing, characterizing, evaluating and documenting the phyto-genetic resources of national programs, placing emphasis on research of the genetic variability of edible native plants. Another objective is to increase the species used in agricultural production and the genetic variability of those used at present.

Peru is one of the countries with the world's largest number of species and varieties of food. PRONARGEN's research directors are very conscious of the importance of such a program, to avoid the loss of genetic material and increase the potential of its bio-technological use.

The Program has over 100 collected and classified species, including 24,000 introduced in 20 collection areas, or germ plasm banks located in as many Agricultural Experimental Stations in the country. In this way, it is attempting to establish policies to handle the exchange of genetic resources in the country on the one hand, and on the other to avoid food security from being threatened because of the lack of genetic variability.

The program intends to coordinate the work on genetic resources in the country with that of other neighboring nations, and eventually form an Andean Bank for Genetic Resources. The present economic crisis, however, has led to certain economic discouragement. Due to low salaries paid at La Molina, there are vacancies for four specialists and five REE assistants.

#### j) Conclusions

1. As mentioned above, the original REE project considered five national programs for priority food products, and one Selva Program. The support of other financial institutions made it possible for the original proposal to expand, with three more product programs that exist at present: Andean crops, oilseed crops and livestock, which actually include a larger number of individual products: quinoa, canihua, oca, olluco, soya, sunflower, peanuts, cattle, smaller animals, etc. There are those who wonder whether so many

products cause efforts to be dispersed, but there is no doubt that these were demanded by the pressures of a country with such a vast variety of ecosystems. Furthermore, some of the people we interviewed claimed that "nothing is done" with yuca and fruit trees and that "cattle-raising has decreased considerably".

What does seem to be a unanimous feeling, is that INIPA has extended to an exaggerated number of stations, in spite of the fact that a small coverage was recommended in the original REE proposal. There were political reasons behind the increase in the number of stations supported, maintaining that "every department wants its own Station". With the improved definition of the scope of the agroecological areas, these have been reduced. Thus, 54 stations and sub-stations were reduced to 34.

2. The success of the improved varieties of priority products was significant, especially rice and corn. However, it seems the genetic potential was overemphasized, whereas relatively little attention was given to other non-genetic such as soil control, humidity, cultural practices and socioeconomic studies. This emphasis corresponded to an influence of the IARC's as these are the world's main germplasm banks. INIPA developed important varieties with these genetic materials, especially insofar as rice and corn are concerned, selecting them depending on their resistance to diseases, vegetative periods and growth season. In fact, INIPA researchers were trained at the IARCs on experimental design, plot sizes, sampling methods, repetitions, analyses and interpretation of results - all emphasizing the selection of varieties.

Actually, INIPA should have placed more emphasis on local growth factors, on the plant, and on the handling of the estate, to permit the development of the potential genetic characteristics of the varieties introduced. This should have been carried out by a local institution.

3. The project enabled the State's agricultural research to regain its professionalism. Actually, Peru has a long-standing tradition of agricultural research, since the National Agricultural and Veterinary School was founded in 1902, today's National Agrarian University (UNA). The activity was significantly strengthened during the thirties with agricultural stations promoted by private landlords organized under the National Agrarian Society, although mostly dedicated to export products. Towards the end of the forties, the State's agricultural research activities were institutionalized in the Ministry of Agriculture, as a fundamental component of the extension service. However, it practically disappeared with the Agrarian Reform which took place in 1969 and during the seventies, except for agricultural research which continued in the UNA and other regional universities. These entities, which were less vulnerable to the influence of official politics, managed to continue their research work, though to a lesser degree. Thus, research was maintained on corn and potatoes connected with the UNA, and on rice with the Pedro Ruiz Gallo University in Lambayeque.

The Peruvian example clearly shows the fragility of agricultural research when faced with institutional discontinuity, with the loss of genetic material, installations and trained personnel, which were either destroyed or

transferred to other activities.

Nevertheless, State professionalism or Academic/University qualifications are a long way from becoming a solid institutional task. It is essential that Societies or professional Associations be formed, magazines issued to promote science, and documentation centers and data banks established to centralize regional or national results. The only professional association that maintains a relative continuity, is the Peruvian Entomologic Society, which is about to hold its National Congress.

4. There is no doubt that since 1982, the Project has significantly contributed to provide equipment facilities, vehicles, operative funds, technical assistance and even materials and salaries for research purposes. These resources became indispensable for the research work carried out by INIPA. The most tangible were agricultural machinery (harvesters, grain hullers, selectors, dryers, sowers, tractors, etc.); vehicles (pick-up trucks and motorcycles); laboratories (soils, nematology, microscopy, phytopathology and animal health); computers and some building infrastructure. The best-equipped stations are Yurimaguas, Tarapoto and Huancayo.

Unfortunately, in many cases inappropriate equipment was purchased for determined areas. We have found vehicles, hulling machines and harvesters that have not been used because they lack spare parts, or because they were inappropriate for working in that area. "We were asked to provide the characteristics of the equipment we needed within two days" - said one of the people we interviewed. As a result, much of the equipment is unused and many vehicles have been dismantled so that others can be repaired.

5. Some of the largest voids were the uncoordinated research efforts between the system's institutions, and there was even a lack of coordination within the institution itself. Although this was specifically mentioned in the initial REE project, due to institutional jealousy, bureaucratic complexity, and above all, the lack of political will, research efforts of Experimental Stations, universities, nongovernmental organizations and other private associations, were isolated. This leads us to conclude that the institutional building of the system is still fragile.

#### IV. EXTENSION AND SUPPORTING PROGRAMS

##### a) Extension

According to the initial REE Project, it was proposed that National Programs by Products should first of all prepare technological packages based on existing research information, and that these packages should be transferred to producers would continue their applied research of specific products, and the results obtained would be included in a system of permanent technological packages for the extension program. Researchers would carry out their duties by visiting individual farms. Programs by products would concentrate on the largest production areas of each product, with four satellite centers covering the largest possible geographical area under production.

The research/extension concept was based on the formation of teams of researchers, extensionists and sectorists coordinated by a team leader, who would coordinate and direct the activities of National Programs. Extensionist would receive the information from research centers, prepare extension packages and train sectorists. Sectorists should extend the packages through visits, demonstrations, meetings, field guides and printed pamphlets.

The project also considered personnel selection criteria, short training courses on research and extension methodologies, to make them aware of the inter-relations and contributions of the different components. Besides extracurricular training, they should have also been trained in the UNA's graduate program.

Furthermore, the project would procure vehicles, plants for repairs and communication equipment (projectors, demonstration material and audiovisual aid equipment). National program centers would also be supplied with bibliographic aid, publishing expenses, operational and maintenance support, salary incentives and international technical assistance for the preparation of technological packages, and appropriate extension methods for small farmers.

Lastly, farmers would receive services such as soil, water and plant analyses through six laboratories. However, with the financing obtained from other donors, the whole concept of the system proposed by the REE was changed.

A greater change took place when the REE Project became part of a national system of CIPAs, which preserved many of the elements, concepts and priorities proposed by the REE, but included others with a far larger geographical coverage and financial budget.

A further change was the physical integration of National Programs, Regional Research Centers and Service Laboratories as part of the CIPAs. The national Research Supporting Unit which would have supplied specialized information on entomology, phytopathology, natural resources, etc., was never implemented.

The CIPAs consisted of 53 Experimental Stations, 233 Extension Agencies and 926 sectors, distributed as follows: 27% on the Coast, 55% in the Sierra and 18% in the Selva. In 1986, INIPA had an extension and development service consisting of 1,459 people, between agronomists, zoo-technicians, veterinary surgeons, and mostly agricultural technicians, distributed as follows: 34 Supervisors, 39 Promotion Area Directors, 277 Specialists, 233 Extension Agents and 926 Sectorists.

Although the research system basically remained the same, the extension method changed substantially. The so-called Training and Visiting (T & V) method was chosen, which was introduced by a team of Israelis contracted by the World Bank. Having proved successful on previous occasions in developing countries such as Turkey and India, sponsored by the same international organization, it was introduced in Peru between 1982 and 1986.

In essence, this method consists of a clear redefinition of sectorists' responsibilities, who perform a cycle of visits to certain leading farmers who serve as a liaison between farmers and also between the farmers and the sources of technical assistance. Groups of eight to twelve farmers, depending on the size of each sector, receive technical assistance from sectorists. The idea is that in every two-week cycle (10 working days), the sectorist makes visits for eight days and leaves two days aside for his own training. During the first week, he is trained by his immediate boss, the Extension Agent, and during the second week by a Specialist.

However, although this system has proved successful in other countries, it did not have the desired results in Peru. In a country where informality reigns, it proved to be too rigid and was not properly adapted to our cultural patterns, nor to the needs of other peasant crops. Finally, deficient materials and economic resources, together with the difficulties encountered insofar as distances are concerned, and the means of communication comprised of rough roads and rivers, did not make the system operative in a country like Peru. To quote one extensionist, "it was not a bad method, but it was badly applied". In fact, it seems that in certain places where initiative and leadership was available to adapt the method to local conditions, satisfactory results were obtained. In the Biabo river area for example, the farmer acting as liaison agent limited himself to playing host to a group of three to six farmers at the most, on whose plots the sectorist performed demonstrations. Because of the distances involved, only three or four visits were made on each route. In other words, the whole concept of having a liaison farmer as a trainer, disappeared. The cost of each farmer's method increased, but the efficiency of the work carried out during two years proved acceptable. Our informant, an Extension Agent, reported that the method "had worked" in Jaen and Ancash, but "had not worked" in Iquitos or Madre de Dios. Several other references indicated that the method had an average performance on the Northern Coast.

In any case, these evaluation references are extremely vague and refer to the problematical nerve-centre of the entire Extension Program, and of the T & V method in particular: Follow-Up and Evaluation.

The agreement between INIPA and the World Bank contemplated the control and evaluation of research and extension activities (pages 35, 36 and 37 of the Agreement and Appendix 6). This would help INIPA's Management with its organizational policies and operative decisions, providing prompt and truthful information on the progress and impact of its programs, in respect of its objectives. It is acknowledged that although the final effectiveness of a program also depends on such factors as input availability and credit opportunities as well as cost related prices in the marketing system, the importance of evaluation and an effective system is obvious.

Nevertheless, however obvious these needs appear, the follow-up and evaluation system was either very weak, or nonexistent for such a large nationwide program comprising so many activities, so much personnel and above all, so many funds. Many of the people we interviewed stated emphatically: "a better follow-up system is required"; "control and monitoring is the problem"; "a method for evaluating the impact is lacking"; "everyone talks about

diagnosis and feedback, but nobody implements them"; there is no methodology for ex-post facto technology evaluation"; "it is subjective"; and so on.

According to the World Bank's recommendations, the extension program's follow-up and evaluation system should not only judge the impact of services in agricultural production (and the farmer's welfare), but also closely follow the progress of the extension system's institutionalization. This should include areas covered by the system, the number and percentage of contact farmers, the participation of neighboring farmers and failures or delays in visits made. Nevertheless, throughout the project, there were considerable delays in the recommended follow-up and evaluation activities.

The first follow-up documents contained important information on the farmer's age, education, number of family members, size of the plots and type of crops on the farm visited, frequency and duration of visits, marketing and credit information. A more complete comparative evaluation of the 1985 - 1987 period (Openshaw & Carrasco) reports an increase in the number of farmers covered, from 1.8% to 19.5% and an increase in the total area from 109,200 has. to 301,400 has., but with a decrease in the average area handled by each farmer, from 5.1 has. to 1.3 has. The reason for this drop could be that in 1987, work was carried out with lower-income farmers. It is also reported that the crops with the most impact in 1987 were potatoes, rice, corn and wheat, and that the impact value rose from US\$19.5 million in 1985 to US\$43.8 million in 1987. However, individual income per unit dropped from \$900 to \$187.

#### b) Agroecconomy

The basic document was prepared in 1983, and the program began in April 1984. Its objectives were to register production costs at a commercial level and by plots, establish comparative advantages and carry out statistical analyses. Subsequently, a data bank and operational methodologies were developed, to evaluate the economic consequences of the technological changes, and research focused on systems. However, crop researchers and extensionists apparently considered this type of activity of little importance, and while they accepted the economic concepts of agroeconomic research at promotional meetings, "they returned to their Stations and went back to doing things their own way", according to one of the people we interviewed.

The Program, which operates in about 20 places, is responsible for the news leaflets containing information on input prices, farm-gate prices of products and production summaries directed at extensionists and farmers, so that these can evaluate whether or not the packages launched are of any use to them. In this respect, the personnel we interviewed pointed out the lack of institutional interest in ex-post facto technology evaluations. He indicated that this was due to the high costs, the lack of appropriate methodologies and the little interest shown at management levels. "It is a strange market concept", he added, "because it is aimed at convincing farmers that the product for sale is good". What occurs is that because the technological product does not cost the researcher anything, he is not really interested in its results. There is no awareness of what it costs the State, and donor organizations no longer demand evaluations". As in other programs, there are

two recurrent problems: administrative obstruction and decapitalization of trained personnel.

c) National Laboratory Services

Regional laboratory services were an important Extension Supporting Program. This service began in 1983 and today there are 17 laboratories, including one for training at the UNA. We found the laboratories we visited to be sufficiently well equipped for soil, water smaller laboratories for nematology of grains.

The UNA Laboratory is used for teaching graduate and non-graduate students, and also to provide services to farmers. However, whereas this laboratory is used to its full capacity, the laboratory at Tarapoto works way below its installed capacity. For example, out of 1,000 soil analyses which could be done each month, only 100 are performed. In spite of the fact that costs are low, farmers are unable to pay them. Perhaps the cost factor is relative however, because those interviewed informed us that most farmers still do not realize the usefulness of soil analyses. To solve this, they suggest conditioning Agrarian Bank credits to service analyses, and/or carrying out a more effective publicity campaign. They also regret that the Extension Service was separated from the present INIAA, because the usefulness of the analyses was publicized through the sectorists.

d) Communication Program

One important activity which is complementary to the extension component, was carried out through the CTTA's communications program, also financed by A.I.D. Using radio and written correspondence as a means of communication, complemented by group-learning meetings, good results were obtained in the areas covered, complementing the extension program's efforts. A specific evaluation of this activity is being carried out by A.I.D. consultants.

e) Conclusions

1. Although the diagnosis responded more to the isolated desires of a group of people rather than to an institutional system, the results seem to indicate that some success was achieved, despite a few voids, and that it is worth continuing to make an effort and carry out in-depth evaluations. The noticeable discouragement shown by so many of the people we interviewed, could be due to the impact of the economic crisis which is causing the loss of personnel in the system, and the recent transfer of the extension program from the INIPA to the Ministry of Agriculture, which has practically paralyzed this activity.

2. It is clear that the economic and technical assistance from the REE provided equipment, operational costs and supplementary salaries which were essential for the Program's existence. Vehicles were acquired (motorcycles) for sectorists, and field equipment such as sprayers, syringes, measurers and machinery. As for research, in some cases the equipment did not respond to local needs and therefore is not being used.

3. There are certain voids in the training of extensionists and sectorists. There were not enough extracurricular courses, and of the 102 specialists who obtained their Masters Degree in the UNA, only 16 were trained for extension purposes. Those interviewed indicated that this qualification is some-what academic, containing certain courses which were rarely used in their professional work. They showed a preference for short courses lasting three to six months.

4. Nevertheless, it was through the Extension Service that a certain presence was felt in the field, although rather distorted insofar as the logo is concerned, which farmers identify as the CIPA but not as INIPA.

5. Lastly, the extension system's technical design in the initial project was basically coherent and realistic for the size of the geographical area covered, with the exception of the insufficient emphasis given to the production systems and to the participation of the private sector.

## V. EDUCATION

The most serious limitation for the development of farming based on science and technology, is the quantity and quality of well trained personnel. This concept is very clearly specified in the REE Project Paper, which is why an Education component was included, which should have permitted the active participation of the University in the REE system, not only as a supplier of regular training resources, but through joint participation in research work.

In respect of the latter, the situation is quite clear. According to ISNAR's reports (1987) and those of Experience Incorporated (1985), there was very little participation on the part of the universities (there are 16 agricultural science schools in different universities in the country, apart from UNA); and there has been no attempt at correcting this aspect. Consequently, the INIPA/Universities relationship is still weak. Insofar as UNA and its research programs are concerned, there was a certain degree of coordination which mainly involved separating the geographical areas. According to researchers from both institutions, the desired coordination did not take place, at least on a formal basis.

With respect to the second aspect of the education component's participation, i.e. academic and non-academic training of the REE system's human resources, the aims established in the project's logical framework insofar as short term and long term, academic and non-academic training of men/month is concerned, have been fulfilled and even surpassed, according to reports from the project and from the INIAA's Human Resources Office. The final result of this effort is summarized in the following table:

REE PROJECT  
GENERAL TRAINING SUMMARY - 1981 - 1988

<u>TYPE OF TRAINING</u>	<u>No. OF PARTICIPANTS</u>
1) Attendance at short-term training events in the country	11,033
2) Masters Degrees obtained in the country (1982 - 88)	102
3) Attendance at courses and working visits abroad	476
4) Masters and PhD qualifications abroad	26
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Total participants	11,637

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Source: INIAA's Human Resources Office

These results reveal a tremendous effort in terms of technical training, considered by many of those interviewed as one of the REE Project's most significant achievements, which enabled the system to be recapitalized insofar as human resources are concerned.

The achievement considered most successful, both by trained personnel and by supervisors, were the short courses at International Research Centers (IARCs), CIAT, CYMIT, IPC - varying from between three to nine months - attended by approximately 70% of the researchers. Apart from the excellent scientific and practical training they received, it should be mentioned that they were given the opportunity to form part of the international scientific community, which generated much work motivation upon the trainee's return.

The results of academic training abroad were successful, as 17 students returned with Masters degrees within the period anticipated (two years), and four are continuing with their studies. Of the five Doctorate students, three have completed their studies and obtained their Ph.D., and two are continuing with their studies. However, we have received comments in the sense that, because there is no Advisory Coordinator in INIPA, many students wrote their thesis on matters of little relevance to the reality of the country.

Insofar as the Masters program at the UNA is concerned, the project provided financing for 102 students, of which eight were still studying when evaluation was made. Of the 24 remaining students who should have obtained their masters degrees, only 20 are aiming for this qualification at present. In other words, only 22% completed the program, which is considered an extremely low percentage from any point of view. (It should be pointed out that the average number of graduates from the UNA who complete their studies

is also very low, around 50%).

Of the remaining scholarships, 17 have completed their studies and passed their degree examinations, and have only their thesis to complete. Likewise, another 17 finished their studies but did not pass the examination. Some of the students may graduate this year or next, thanks to the efforts made by INIAA's Human Resources Department.

There are several opinions concerning the reasons behind the poor success of the program. The most valid argument is probably the reference to the poor quality of the candidates, many of whom finished their university studies several years ago and did not fit into the rhythm of work, nor did they have the knowledge required by a Masters program as demanding as the one offered at the UNA.

The closest we have come to obtaining the students' version, is that the program was "too academic", as indicated in one example, with far too much emphasis placed on statistics, which appears to be the key factor causing students to drop out. It is also felt that the University's requirements for the thesis are too demanding.

The UNA reports that the problem lies in the fact that sufficient financing for thesis preparation was not anticipated in the Project, and is an expense neither the University nor the students are able to absorb.

In our opinion, the true reason for the low graduation percentage could be a combination of the above mentioned factors, aggravated by the lack of motivation to obtain a degree, due to the fact that the system of promotions and remunerations - as may be appreciated below - offers few incentives and hardly acknowledges those who have obtained a Masters degree.

We recommend that a more in-depth analysis is made of the causes of this problem, because it will continue to affect the training program proposed by the ATT Project. Another peculiar characteristic of the UNA's Scholarship Program for a Masters Degree, is the imbalance between the number of students from the REE System's Research Component (79), compared to those from the Extension Service (15). This merely reflects the fact that there is no training capacity for extensionists in the country, since the only university offering such training (UNA) offers one semi-specialization in Production and Extension, compared to 15 Research specializations.

We also believe this phenomenon is associated with certain characteristics perceived in the system, regarding the role played by researchers and extensionists, which may have prevented a better relationship between both groups. Researchers generally tend to consider themselves superior to extensionists, and have a tendency to evaluate themselves as scientists and to have higher intellectual goals, such as obtaining Masters or Ph.D. degrees. The truth of the matter is that there seemed to be more motivation for professional education among researchers than among extensionists.

This is probably why during the 1968-80 period, research work

continued to exist in some way or another in universities and in a few other educational centers in the country, despite its limitations. The extension service on the other hand, totally disappeared during the same period. This is why when the REE system was rebuilt, the personnel recruited for research purposes was more experienced and more motivated than those recruited for extension purposes. Some officials pointed out that "the best people go in for Research".

Research supervisors appear to be far more satisfied with what their people have learned in the UNA's Masters courses, than extensionist supervisors. The latter consider short training courses to be more appropriate for extension purposes, since they enable extensionists to remain in the field for a longer time, placing more emphasis on practical aspects. The idea that extension training could take place not only through a Mastership but also through a one year course under the criteria of a "second specialization", was well accepted.

INIAA officials generally consider that UNA's Masters Degree is of a high standard, but they feel it should conform more with the specific requirements of the REE agricultural system. In other words, certain modifications to the program's curriculum could be suggested to make this type of training more valuable to the institution (INIAA). Apparently the UNA is not too happy about such initiatives. According to its directive bodies, they have many students besides INIAA's personnel. Perhaps with a closer relationship between both institutions, more flexibility could be obtained, without affecting the standard of the University's Masters Degree.

The Education program appears to have been handled inefficiently until 1986. Only after that year did annual training programs take place, with a proper balance between the areas where INIPA required trained personnel, and clear guidelines for the selection of scholarship candidates. Many problems apparently occurred at the beginning of the program, such as the lack of an adequate system to follow up the students.

One area where there is a noticeable void in the Project's Education Program, is Farm Management, and in general terms, farming performance. This area is particularly important, because an active component of the REE System in the country, is the transfer of technology aimed at reclaiming the private sector's active participation. The education offered by the UNA should include criteria and techniques for an efficient handling of resources.

Although the INIAA's Human Resources Office in Lima reported that 92% of the trainees have returned to their original jobs, our understanding of the problem concerning trainees who drop out of the system or their under-employment, was entirely different, from what we perceived during our visits to and interviews at the Experimental Stations.

Apparently, trained professionals do return to their original work centers, but because of the inexistence of an adequate mechanism of remunerations to reward them financially for the qualifications they obtained, trainees feel forced to apply for - and generally obtain - jobs offering higher salaries, which are mainly administrative. We came across several such

cases in the stations we visited. This is how, in the long run, training is badly applied.

Furthermore, trained professionals do not keep to their commitment to render services to their institution for a period twice as long as their training course, when a possibility arises to serve the State in another public company. In this way, many trained researchers - not only formally but also informally - (in contact with international experts) are joining public entities such as ECASA (the rice marketing company) and ENCI, and the Agrarian Bank, earning up to three or four times the salaries paid by INIAA.

At the Experimental Station in Tarapoto, we found only one of the six trained rice researchers and one of the five trained corn researchers who had worked at the station at some stage. The engineer responsible for corn research commented that his salary was equivalent to US\$50 per month, and that ENCI had offered him US\$200 for doing a job that did not require the training he had obtained.

A similar problem is about to occur in the Experimental Station at Chincha, where although not many of the researchers have left, their morale is very low, and they are looking for other jobs. Here, for example, a researcher with a UNA Masters Degree, fully trained by the work he carried out with the co-leaders (international) of the grain legumes program and also at short training courses in the CIAT, earns I/.160,000 (US\$50) per month. At the neighboring private experimental station of FONAGRO, farming technicians earn I/.300,000 (US\$95) and a professional researcher is paid over I/.450,000 (US\$150).

With respect to the short courses and seminars held in the country, we have listened to various arguments regarding their relevance and quality. What does seem true is that there was no system for evaluating results to enable modifications to be made in accordance with achieved aims.

To summarize: the education program was unable to incorporate the country's universities within the REE system in a coordinated manner; the short term training programs in International Centers were unanimously praised, unlike short term training within the country, which did not have an adequate evaluation mechanism; long term academic training abroad achieved its goals and the percentage of graduates from the UNA (Masters) was very low (20%), research training had more acceptance than extension training; extension training is inappropriate.

In general terms, however, training is considered to be an important achievement of the REE Project, although the reinsertion of trained professionals is a concern due to poor promotion and remuneration conditions.

## VI. INSTITUTIONAL, ORGANIZATIONAL, ADMINISTRATIVE AND FINANCIAL ASPECTS OF THE REE PROJECT'S IMPLEMENTATION

### a) Institutional Aspects

The following were the two main objectives of the REE Project:

1) The consolidation of an institutional basis for an Agricultural Research, Extension and Education System that, in the long term, would allow advantage to be taken of local efforts and foreign cooperation ("Institutional Building").

2) To generate and transfer to producers in the country, a flow of appropriate technologies which could result in sustained increases of agricultural productivity, production and income.

As described in Chapter I, paragraph d), the enormous technical and financial efforts demanded by the implementation of the REE Project so that its objectives could be fulfilled, had to operate in an environment where structural characteristics typical of local public administration, were a serious challenge for the attainment of the proposed goals, since contents and decisions which should be strictly technical, were often distorted.

The manner in which these challenges were faced and overcome by the REE Project, should prove the merits of the implementation efforts. Likewise, the fact that these aspects and the efforts made to overcome them, could have been underestimated, may have prevented a better achievement of the objectives.

Although it is not an easy matter to establish the extent of the failure to face these challenges, which often went beyond the framework of the project, but we do believe it is important to analyse the lessons learnt and draw up a sketch that could serve as a guideline for the design and implementation of future efforts with similar objectives.

First of all we must say that the REE Project fulfilled a very important role in the institutional building of the system's main entity: INIPA, now INIAA. Below is a summary of the conclusions we reached as a result of our analysis of the project:

(1) INIPA's Performance.- The REE Project enabled the institution to operate. This criteria, obtained from one of our interviews, seems sufficiently clear. In synthesis, one of the institution's ex-Heads made the following *emphatic* (probably exaggerated) statement: "Without the REE, INIPA would not have operated". The financial and technical contribution was not only important in itself, but also encouraged other international donors to make important contributions under the same design. The prospects and flexibility in the way funds donated by A.I.D. were used, was an important factor for the continuity of the institution. In this way, it was possible to create - and maintain for seven years an institution that agricultural researchers and extensionists slowly came to regard as their own, with a professional pride which had not been evident for a long time.

Professionals in research and agricultural transfer of technology thus had an institution which kept them together and represented them on a local scale, which the area's best Peruvian professionals were able to fall back on in one way or another.

(2) Technical Assistance Provided Continuity.- The technical assistance provided by the REE Project, through the North Carolina State University

(NCSU), is almost unanimously considered to have been of a high standard, especially in its long-term component. Besides the quality of the technical assistance provided, the role which had not been anticipated but was nevertheless fulfilled by the NCSU, was very important in ensuring the continuity of the Project's technical scheme and of INIPA. Due to the continuous turnover of INIPA's Management and staff, very often the NCSU Head was more aware of INIPA's activities. Thus, a liaison was established between managements, making it possible for the Project's - and INIPA's - technical scheme to remain in operation.

(3) Physical and Human Recapitalization.- The REE Project, with the cooperation of other donors, made it possible to reincorporate and improve the physical infrastructure (buildings) and equipment (vehicles, laboratories, computers, machinery) of a network of experimental stations and extension agencies throughout the country (REE implemented headquarters in the country's center and eastern areas). In this way, it was possible to provide INIPA's professionals and technicians with the essential physical means required for their work. Likewise, the Project's full training program not only enabled INIPA's human resources to obtain better technical qualifications, but also gave them more motivation and provided good prospects so that for a time at least, the institution was able to attract and maintain highly qualified personnel. The salary compensation mechanism in force for a time, also contributed to the above in one way or another, while it lasted.

Although the above mentioned aspects are undoubtedly a good argument for the way in which the REE Project contributed to INIPA's institutionalization and the process of agricultural development and transfer of technology, many challenges were not successfully met, as seen below, causing inconveniences to the efficient implementation of the Project's technical content.

(1) INIPA's low degree of autonomy and excessive political interference.-

- Dilution of efforts: Technical reports that provide an in-depth analysis of the Project's implementation process (Mid Term Evaluation, ISNAR, Experience Incorporated, etc.) coincide in mentioning that an excessive dilution of efforts took place when coverage was extended to 50 experimental stations and substations, when it would have been better to select a maximum of 12 - one for each main agronomical eco-system in the country. The REE "Project Paper" clearly suggests a strategy to concentrate resources and efforts (five regional centers) which could be extended gradually. The decision to extend the initial coverage so soon, probably reduced the technical efficiency of the research and extension process and all indications are that it was a decision taken by INIPA under strong political pressures from outside the Project.

- Excessive increase in Personnel: INIPA, at the time of its creation, hired an excessive number of people. Thus, its personnel consisted of more quantity than quality, which from the very beginning prevented it from fulfilling its role and its final objectives. (Various studies and opinions of specialists indicate that over 50% of INIPA's staff was superfluous.)

Another example of institutional rivalry which affects the REE System and the Project, is between INIPA and the Ministry of Agriculture. We have listened to repeated comments about this situation, which may have created discontent among Ministry of Agriculture professionals and employees, particularly at a regional level, since their counterparts at the CIPAs and Experimental Stations had new vehicles at their disposal, travelled abroad on training courses, and earned higher salaries at some stage.

This sort of argument should not be underestimated, since more than likely it played an important role in applying pressure on the restructurization mentioned above, which resulted in the extension service being separated from INIAA.

Certain elements of such "institutional rivalry" are probably also found as the basis of the practically nonexistent integration between the regional universities with agricultural science schools (17 in the whole of the country) and the UNA and the INIPA, within the REE System's framework.

The three factors we have just analyzed illustrate the serious challenges faced by the REE Project in its attempt to achieve its objectives, particularly in the institutional building area, but also in the efficient impact of the technical efforts displayed. The prospects and limitations of the different strategies used to face them, shall be discussed further on, when we refer to the role played by A.I.D. and the NCSU.

Within the framework of the REE Project's Institutional aspects, we consider it important to insist on the lack of participation by the private sector. Although such participation was not included in the design of the Project, nor in its amendments (and therefore it is not part of the implementation work), we believe it is quite clear, and generally accepted (by those interviewed), that this was an important void which could have positively influenced the research and extension institutionalization process. Mid-term evaluation reports, and those of "Experience Incorporated", explicitly recommend this. We believe that the existence of certain methods for the private sector's participation in the REE System, could have contributed to obtain more credibility, continuity and integration with productive sectors, as well as more efficient criteria insofar as the use of resources is concerned.

It could also have contributed to the effects of the structural factors mentioned above; particularly with respect to political interference in the system's technical decisions.

"Institutionalization" is not only the responsibility of the public agency, but of the entire REE System. Because of occasional deficiencies in the institutional handling of the REE in the public sector, the private sector may become an alternative source of complementation and continuity.

We believe the situation we discovered in Chincha is very illustrative, where efforts are coordinated through agreements signed between INIAA Experimental Station and FONAGRO (private sector). Apart from distributing crops and research information, FONAGRO uses INIAA's Experimental

Station as a warehouse, for cold storage and other uses. INIAA is unable to make use of these facilities because of the lack of operative resources. In this way, FONAGRO carries out applied research and maintains its presence in the field by paying for technical assistance services.

FONAGRO's engineers and technicians earn much higher salaries and are more stable than those of INIAA. Thus, our general impression of the way the equipment and facilities are handled, leads us to believe that FONAGRO's institutional horizon has far more to offer than its public counterpart, if by "institution" we mean the group of human beings working in a coordinated manner towards a single goal, efficiently using its economic and organizational resources.

b) Organizational/Administrative Aspects

(1) Organizational chart and Operational Ranks.- The project provided INIPA's organizational chart (local Management, CIPAs, Experimental Stations) with a structure based on its National Programs scheme, with a leader and co-leader for each program. In general terms, this worked well in spite of the apparently intricate degrees of authority. In some programs however, certain functional voids were reported, with respect to the performance of program leaders, Heads of CIPAs, Directors of Experimental Stations, Researchers and Extensionists. The success of the scheme depended mostly on the ability of the leaders and co-leaders to be sufficiently tactful when performing their duties.

- The presence of two executive management offices in INIPA - one for Research and one for Promotion (including extension) - with authority over the CIPAs, created some confusion. Above all, because of a personality clash, the apparent controversy between research and extension continued down the ranks. This problem contributed to generate the fairly widespread image that there was no proper coordination between the research and extension components. There was apparently more coordination at a regional level than in the Head Office.

(2) Inter-Institutional Coordination.- The National REE System's Administrative Unit specified in the "Project Paper", was never implemented and was replaced by administrative activities to support INIPA. However, such a unit designed to guarantee planning coordination, implementation and evaluation of the activities of the REE System and the formal or informal establishment of inter-institutional agreements, was never replaced. The "Project Paper" had anticipated that INIPA's representatives, UNA, the Ministry of Agriculture, Regional Universities and other institutions within the REE System, should participate in this unit.

Formally, no clear coordination methods existed, which is why certain activities overlapped and some repetition of efforts occurred, which were difficult to overcome, as indicated in previous evaluations.

In the Huancayo area, for example, according to the information obtained from an INIPA experimental station official, there are five Agricultural Research Centers on the same route, practically adjacent to each

other: the INIPA Experimental Station (Santa Ana), the UNA's Regional Institute, the Universidad Nacional del Centro, IVITA and IPC. He stated that during his two years' service in Huancayo, he does not recall ever meeting formally with representatives of other research centers to coordinate activities.

Coordination between UNA and INIPA regarding their respective corn, wheat and potato research programs, was carried out more informally than formally, and was practically confined to the distribution of geographical areas, therefore a repetition of activities could not be avoided.

To summarize, institutional coordination in the REE System did not reach the desired levels anticipated in the Project Paper.

This cannot be blamed on the implementation of the Project, because of the factors mentioned above.

(3) Administrative Equipment.- The Equipment component of the REE Project, made a donation to INIPA of 52 microcomputers, which in 1988 permitted the inauguration of a computer network linking 12 stations and 23 experimental substations. The master computer is in the main office in Lima. This equipment was aimed at serving both research and administrative activities of the institution. Through the quantitative methods of the support program, the provision of technical assistance was duly anticipated, to provide INIPA with advice on the efficient use of such facilities. Likewise, personnel from all regions received training.

The equipment arrived during 1984/5, however its administrative application (payrolls, budgets, warehouse control, inventories) was only developed since 1987. Apparently the frequent management turnover affected these activities, since "a clear picture of what should have been done was lost". There is some equipment which has never been used, according to one consultant's comments.

There is, however, an ample potential for its use and a good knowledge of its operation. INIAA and the REE System now have a very important instrument to improve the efficiency of their operations.

(4) Management Turnover.- The excessive management turnover mentioned above, affected the integral handling of the institution, given a degree of verticality and concentration of authority in INIPA's organizations structure.

Among the six Heads and the one Temporary Head who took charge of INIPA during the life of the REE Project, there were agronomists, zootechnicians, agricultural economists, administrators, each with his own ideas as to how the institution should be handled. Although the REE Project's Production Programs were clearly structured and the technical assistance from the North Carolina State University guaranteed continuity, the impact of this turnover was clearly evident, particularly in the implementation of support programs. Some such programs were created and promoted by one Head and neglected by the next (at least in the opinion of the participants in the program). This type of negative effect became more evident in the case of

agroeconomic programs, genetic resources, quantitative methods and integrated pest management.

It was not up to us to analyze the reasons for this constant management turnover, but we believe it did not conform to the overall REE strategy. In any case, the traditional "short-term" nature of local public administration (lack of long-term prospects) was reinforced, helped along by the permanent restructurization of the institution.

An additional factor was the apparent excessive concentration of decision-making powers in INIPA's management. These aspects do not fall within the scope of the REE Project, but they did affect its efficiency. It is not the object of this report to go into too much detail, however we should like to draw attention to the method whereby resources for research purposes were assigned in the different programs. We believe this delicate decision-making process could have been shared. For example, we understand that the REE Project's resources were assigned on the basis of the budgets prepared for each program, however the final decision on whether the funds assigned should be cut back or increased, was made between the Head of INIPA and the local Project Coordinator. If this was the case, this may have been an efficient mechanism, but we believe alternatives could be studied so that a sort of Board of Directors or Executive Committee could make the more strategic decisions, to reduce the impact of the frequent management turnover. We repeat that this problem, if it is a problem, falls within the scope of INIPA (INIAA) and does not apply to the REE Project.

(5) Excessive Administrative Growth (in INIPA).- Again we refer to a specific INIPA problem, but perhaps the REE Project could have helped to solve it. In any case, the Project was indirectly affected by the consequences of this problem. The excessive administrative growth was mentioned on many occasions, and we understand this to be: (a) an excessive number of administrative personnel which bears no relation to INIPA's technical staff; (b) the Technical Staff's feeling that they are at a disadvantage with respect to the administrative staff; (c) the frequently mentioned delays in the institution's operation, caused by bureaucratic red-tape, mainly concerning purchases of materials, per diem authorizations, spare part orders, photocopies, etc.

In any case, it was found that technicians generally had the impression that the prompt and efficient handling of the operations was obstructed by administrative red-tape. Professionals with a long-time experience in the sector, recall that previous projects related to the SCIPA, SIPA, the North Carolina State University and the Rockefeller Foundation were more flexible and had a more efficient administration than INIPA. Others suggested that donated funds could be handled more efficiently by a private entity, which could administer such funds on the donors' behalf.

(6) Insufficient Follow-up and Evaluation mechanisms.- Participants (professionals) in the Project's different local programs, acknowledged the fact that a void existed in the validation of developed and extended technologies. That is to say there were no appropriate mechanisms available to evaluate how far the developed technologies were adopted, nor to identify

the factors that could be corrected, with feed-back from the research and extension process and procedures.

The permanent unit planned by the WB - the USE (Follow-up and Evaluation Unit) - never worked. NCSU made some attempts to make it work in 1988, practically towards the end of the Project. Various reasons were mentioned to justify this void: a) the high cost of follow-up and evaluation operations; b) the lack of know-how on appropriate methodologies and c) the lack of institutional and/or political will. The last reason takes us back to the subject of institutional problems.

(7) Lack of Proper Image Build-up.- Perhaps a few of the problems faced by the REE Project would have been avoided if INIPA had projected a better image. We are not referring exclusively to the general public, but also to the bodies within the public or private agricultural sector itself. Research is an economic process which is socially profitable but not visible in the short term. We believe INIPA's and the REE Project's objectives, scope, methods and achievements could have had more and better dissemination. We have the impression that high-ranking officials in key positions in the agricultural sector at the time important decisions were made, were not properly informed of the institution's prospects and objectives.

The efforts made by the agro-economic program and NCSU, such as the publication of the Norton-Ganoza Report (Return to Agricultural Research in Peru), although praiseworthy, were apparently not adequately disseminated.

Another obvious void was the fact that the main institution's name (INIPA) was not included in that of the regional institutions (CIPAs) thus confusing "clients". Nobody in the field was aware of INIPA's work - only of the CIPAs'. This probably contributed towards creating the image that INIPA was an elite institution located in Lima.

#### c) Personnel Aspects

This aspect is of prime importance to research and extension and their stability as a system, therefore we shall deal with it separately, rather than as an administrative aspect.

(1) Training: It has already been mentioned that an important achievement of the REE Project was the extensive training prospects offered in the long and short term, both locally and abroad, to all the REE System's personnel, but particularly to INIPA's staff. (See Chapter V).

(2) Excess Staff: The staff originally recruited by the institution was excessive and not in keeping with its requirements. There are those who refer to this fact as the birth of a monster rather than of a child. Reports from the Human Resources Office and other opinions of experienced professionals, state that between 40% and 50% of the staff hired by INIPA were excessive. In addition, most of the staff were unqualified for their corresponding jobs. In the study often referred to - ISNAR - it is estimated that only 38% of the extensionists were properly trained for their job.

Unfortunately, the process to rationalize the staff, putting quality before quantity, was made difficult, if not impossible, because of the structural nature of the Public Administration in Peru. INIPA's strong Union made any move in this direction even more difficult.

Consequently, the institution and the REE Project were forced to operate under conditions that affected the efficiency of the resources used. Therefore, when faced with GOP Budget cut-backs, for example, (real) salaries were generally reduced, but the number of staff remained the same. Likewise, the attempt to obtain stability for technicians, based on salary supplements, was relatively unsuccessful precisely because of the number of people who expected to receive such benefits.

(3) Low Salary Levels: Although this problem, like the previous one, was actually INIPA's and not the Project's, it is worthy of mention and should be emphasized, as we believe it is a key factor which could endanger the viability of future projects if not properly handled soon, and the viability of the institution itself, and of the whole system.

From our observations throughout the evaluation, we have discovered that real salaries of INIPA's professionals and technicians have reached unbearably low levels. At important Experimental Stations, we found excellent researchers with Masters Degrees, with many years' experience, earning salaries that barely exceed US\$50. We also found one temporary leader of a support program earning US\$75. For comparison purposes, it is worth mentioning that for a similar job, a (nonprofessional) agricultural technician in a private station (FONAGRO) in Chincha, earns at least US\$100.

Salary levels in public institutions governed by other regulations (Agrarian Bank, ECASA, ENCI and even Universities) are much higher than INIAA's salary levels for similar jobs that have more requirements and responsibilities (three or four times as many in some cases), according to comments made by professionals themselves.

Under such conditions, it is not hard to imagine the degree of demoralization among workers, and the massive flight from the institution of highly qualified personnel, with negative consequences for the Agricultural REE System in Peru.

The case of one good researcher in the Experimental Station at Tarapoto is truly relevant: in an attitude of "scientific mysticism", he decided to continue his research work and turned down an offer of a job in ENCI at four times the salary, which only involved "counting sacks of corn". It is most unlikely that this situation can hold out for long. One ex-INIAA Manager mentioned that he had obtained approval for the institution to be included in the same salary scale established by Law 49016 (governing Public Companies). We were unable to go into this further, but we think it should be looked into.

(4) Incongruencies of the system of Promotion: We were informed that in general, recruitment in INIPA was made based on merit. The promotion system has the same structure and standards as the Central Government scale, which

did not contemplate - until 1988 - a clear mechanism to provide financial incentives to staff who obtain higher qualifications (Masters-Doctorate degrees). Thus, there is no motivation to obtain such degrees, and the demoralization factor of those who return from their studies and rejoin the institution, is evident. Because administrative positions have a higher remunerative level (Heads of Sections, Directors), very often specialists trained through the REE in such aspects as Phytopathology, Entomology, etc., assume administrative positions. In this way, no advantage is taken of the few well-trained technical personnel.

d) Financial Aspects

The Project's initial financing was US\$15 million, of which US\$11 million corresponded to A.I.D.'s contribution (US\$2 million donation and US\$9 million loan). Subsequent amendments encouraged more donations, therefore final figures of the A.I.D.'s contribution rose to US\$19.5 million.

The total amount spent on the REE System, however, including contributions from the WB, IDB and GOP, reached US\$230 million during the 1981-88 period. (1/)

A.I.D. resources were used as follows: \$4.6 million for construction, \$6.2 million for equipment, \$5.1 million for technical assistance through the NCSU, and the rest on Training. (1/)

Of the total resources invested in INIPA (between 1981-88), 25% was aimed at administration, 37% at the research component, 35% at extension, and 3% at education. (For this component, A.I.D.'s contribution increased by 75%).

We were informed that there was more fluidity in the disbursement of A.I.D. funds than those of other donors, providing INIPA with an added facility when liquidity was a problem.

The liquidation of expenses caused some delays at first, and prevented the flow of advanced payments of A.I.D. funds. The delays were caused by the fact that all of the CIPAs' liquidations were remitted to Lima. Thanks to the pressure applied by A.I.D., it was possible to speed up the process and minimize the problem until the Project was finished.

The GOP's irregular counterpart contributions constituted a major problem with respect to financial flow to INIPA.

Due to restrictions typical of each institution, GOP delays in supplying the agreed upon counterpart funds, caused delays and standstills in fund commitments. The extreme case was the World Bank, who finally decided to withdraw from the Project in 1987, when less than 30% of the resources WB granted had been spent.

The irregular flow of funds from the Public Treasury appears to have been a chronic deficiency. We heard that during the Project's seven years, there was only one in which no delays occurred.

The problem is that the research process requires continuity because it is governed by agronomic cycles, therefore its actions and expenses cannot be detained or postponed. Because of this, the above mentioned delays contributed to a loss of efficiency of the process. The perceived excessive dependence of INIPA's operation on foreign aid funds, is worrying for long-term prospects.

e) A.I.D. Implementation

The role of A.I.D. in the operative implementation of the REE Project is widely recognized by its protagonists.

(1) Good Technical Design: Based on the NCSU's "Basic Study" carried out by excellent Peruvian and foreign professionals, the technical design of the REE Project was very complete, except for the omission - probably realistic at the time - of the active participation of the private sector in the REE System.

(2) Leadership Coordination between Donors.- A.I.D. is recognized as the entity that played a key role in the system, based on clear objectives that permitted the overall Project to considerably increase its resources through other international donors (WB, IDB). Furthermore, it was responsible for the permanent and effective coordination between donors, which guaranteed the complementary support.

(3) Management Flexibility.- A.I.D. showed great flexibility in adapting to the sector's circumstances and political climate. The initial project was amended on twelve occasions, and funds were increased in accordance with the adjustments required by its implementation. They were more fluid in the timely disbursement of funds than other donors, permitting INIPA to overcome some serious operative difficulties.

(4) Excellent Technical Assistance.- The selection of NCSU to provide the necessary technical assistance was highly praised. It is generally recognized that this University not only has a solid technical reputation in the country, but also, because of its years of experience, has become a leading light in the Peruvian Agrarian Sector. The quality and timeliness of the technical assistance provided was generally acknowledged.

The following are among some of the aspects which could have been handled better during the implementation of the Project:

(1) Lack of Efficiency in Obtaining Supplies.- Obtaining supplies of equipment for part of the Project was strongly criticized during our evaluation. Criticisms refer particularly to (a) the excessive delay in purchases, which sometimes took over a year to arrive after the order had been placed. This was complicated by the lack of resources in INIAA to clear the project purchased equipment through customs; (b) the purchase of American

(FORD) work vehicles was also severely criticized, because they were equipped with electronic components that deteriorate rapidly, given the conditions in the country (bad roads), which were not easy to replace or repair. At the experimental stations we visited, we noticed that a high percentage of project financed vehicles were out of circulation; (c) some of the equipment purchased was not appropriate for local conditions (we saw one such harvester in Tarapoto and a sower in Chincha); (d) apparently a proper allocation of resources for spares was not duly anticipated, to allow for more flexibility.

(2) Reduced Leverage.- Perhaps it is asking too much to consider that A.I.D. could have applied more diplomatic pressure when handling the Project, to guarantee a better technical implementation, as mentioned by one person interviewed. We believe however, that because of its substantial technical/financial contribution, A.I.D. could have played a better role, particularly as regards: (a) ensuring that inter-institutional coordination mechanisms were complied with; (b) avoiding frequent changes in INIPA's management; (c) fighting the tendency to over-extend the scope of the Project with respect to available resources; and (d) insisting on the application of follow-up procedures and evaluation to validate the developed and extended technologies.

(3) Image Build-up.- We believe A.I.D. could have contributed more to promoting both the image of INIPA and of the Project. As mentioned before, there was not enough awareness of the objectives, difficulties and achievements of the REE, INIPA and A.I.D. outside the institution, and even within the agricultural sector itself.

## VII. LESSONS LEARNED

(1) The general experience of other countries has been confirmed: agricultural development based on science and technology opens up enormous possibilities to obtain sustained increases in farmers' productivity and income levels. Although impacts obtained are clear, efforts should be continuous and long-term.

(2) The continuous, long-term agricultural technological development effort, involves two basic issues in Peru: institutional stability and international technical and financial assistance at least for the next ten years.

(3) Coordination between international donor institutions should not only be a possibility but an absolute necessity. It can be obtained through appropriate contact mechanisms, the development of a harmonious, complementary assistance from donors, under a single basic scheme and with the same objectives. The success of the REE with AID/WB/IDB and other donors is worthy of mention.

(4) The REE Project's two main proposals were correct: efforts should be concentrated and placed in order of priority (National Programs) and a Research-Extension-Education System should be formed. The latter concept, however, should not be confined exclusively to the public sector.

(5) Technical and financial efforts committed to the consolidation of an effective REE System, must face a combination of "structural" characteristics in the Peruvian public sector which must not be underestimated and which could distort the technical content and continuity of the projects and the system as such.

Among such characteristics we should point out: the insufficient level of autonomy of research institutions, excessive political interference, rigidity in public administrative standards and an endemic institutional rivalry. It is recommended that more care be given to these aspects in similar projects.

(6) The consolidation of an efficient Research-Extension- Education System cannot operate without the active and complementary participation of the Peruvian private sector. This sector contributed significantly to the agrarian technological assistance and financing to the Agrarian University at La Molina. Its participation in the Peruvian agrarian technological strategy would give credibility to the results of the REE system, a criteria of efficiency in the handling of resources, continuity in the long-term, and would contribute to balance out the effects of the public structural factors mentioned above, particularly the excessive political interference in the technological field.

(7) The integration of the Research and Extension Process, though difficult, is absolutely essential for the operation, as a system of development and dissemination of agricultural technology. An improved integration could place more emphasis on the transfer of know-how, information and experience between researchers and extensionists. Difficulties in obtaining an effective integration depend more on institutional factors than on technical ones. Training of extensionist is a key factor, not only in technological terms but in communication and leadership mechanisms. The training and visit method is not the most appropriate for the country's conditions, except for a few sectors on the Coast and the Jungle.

(8) Considering that the human resources are qualified, the main factor in the operation and continuity of research and extension systems, it is extremely negative to depend on salary scales which do not reflect the competence of qualified staff. Consequently, these restrictions often cause a massive flight of human capital, thus making the REE System more unstable.

(9) So that the scarce number of qualified staff can become more stable and efficient, a clear technical career system should be established that should include the competitive factor when jobs are assigned and provide incentives via promotion scales, with compensations with respect to the academic degrees obtained, years of experience, and quality of performance.

(10) Coordination between the institutions participating in the agricultural REE system is a priority, to guarantee an efficient operation and avoid a repetition of efforts and competition from sources of finance. The establishment of clear mechanisms for coordination and inter-institutional communication at a local and regional level, are essential.

(11) Channelling financial support for the operation of the REE System through a single public entity is risky. Flexibility, promptness, efficiency and participation in the use of such resources, could be improved if they were handled by an independent entity, whether private or mixed.

(12) Credibility in the efficiency of the REE System requires a lot of follow-up and evaluation of the farmer's needs, the adaptability of recommendations and of technological packages, and the coverage and understanding of messages. Extension, follow-up and evaluation methodologies should be developed in accordance with the various ecological zones in the country, and its products and cultural patterns.

(13) Projects for the development and transfer of agricultural technology in Peru could be complemented and their impact multiplied through an additional effort to establish efficient systems of production, multiplication and distribution of improved seeds. The participation of farmers and users of seeds in the planning and supervision process should be encouraged.

(14) The level of local Masters Degrees obtained at the Agrarian University will remain low as long as insufficient attention is given to the efficient recruitment of scholarship candidates; until the curriculum becomes more flexible, in accordance with requirements; and until the necessary resources are provided to the University and students become truly motivated.

(15) In an institution building of an organization of the size and national coverage of INIPA, communication is a basic factor for its internal and external operation, as a means of establishing and publicizing the organization's objectives, motivating and creating an atmosphere of institutional identification whereby members wish to contribute and coordinate inter-institutional relations. In this sense, it would have been necessary for INIPA to have stable personnel, well qualified in communications or related sciences (sociologists, anthropologists, sicologists, administrators).

(16) The basic idea of introducing the concept of systems in the analysis and handling of production, although first used in the Sierra, Selva and in Agroeconomy Programs, was a very interesting technical progress that cut through the National Programs by products, and made alternative technologies more realistic to the productive complexity of the small farmer.

(17) The promotion of a good institutional image and of the project is an important factor within the support and development strategy of the REE System, which cannot be neglected.

(18) Donor entities, given the volume of their financial and technological contribution to the REE System, could and should broaden their diplomatic persuasive powers with local entities and the GOP, in order to guarantee more coherent and strategic decisions which affect the development of the implemented projects.

ABBREVIATIONS

A.I.D.	Agency for International Development
ATT	Agricultural Technology Transformation Project
BAP	Agrarian Bank of Peru
CDR	Rural Development Centre
CIAT	International Tropical Agriculture Research Center
CIDA	Canadian International Development Agency
CIPA	Agricultural Research and Promotion Centre
CNPA	National Rice Producers Committee
COPACA	Cooperative Project for Andean Crops
CORDE	Departmental Development Corporation
CYMMIT	International Corn and Wheat Research Center
ECASA	Rice Marketing Company
EEC	European Economic Community
ENahr	National Rural Household Survey
ENCI	National Marketing and Input Company
FONAGRO	Agricultural Development Fund (Chincha)
FUNDEAGRO	Agricultural Development Foundation
FUNDEAGRO	Wheat Development Foundation
GOP	Government of Peru
IARCs	International Agricultural Research Centers
IDB	Interamerican Development Bank
IDRC	International Development Research Center
IICA	Interamerican Agricultural Cooperation Institute
INIA	National Agricultural Research Institute
INIAA	National Agricultural and Agroindustrial Research Institute
INIPA	National Agricultural Research and Promotion Institution
IPC	International Potato Center
ISNAR	International Service for National Agricultural Research
LRS	Regional Service Laboratories
MA	Ministry of Agriculture
NCSU	North Carolina State University
ONA	National Agrarian Organization
PADI	Agricultural Planning and Institutional Development Project
PL 480	Public Law 480 - Food aid to less developed countries
PNP	National Production Program
PRACIPA	Andean Potato Research Program
PROINPIC	Integral Crop Protection Research Program
PRONARGEN	National Genetic Resources Program
REE	Research, Extension and Education Project
SNA	National Agrarian Society
UNA	National Agrarian University at La Molina
WB	World Bank

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ANNEX I

PERSONAS ENTREVISTADAS EN EL PROCESO DE  
EVALUACION DEL PROYECTO IEE

NOMBRE	AREA	POSICION ANTERIOR /IEE	POSICION ACTUAL
Pelaez, Mario	general	Jefe INIPA	Jefe INIAA
Quijandria, Benjamin	general	Jefe INIPA	Consultor indep.
Pacora, Lander	general, TTA	Jefe INIPA	Director FUNDEAGRO.
Grobmann, Alex	general	Jefe INIPA	Gerente GENTEC DATA
Chavez, Antonio	Coord/Adm	Coordinador Local	Director Tecnico INIAA
Scarneo, Luis	Coord/Adm	Coordinador Local	FUNDEAGRO
Arca, Manuel	Inv.	Director Ejc. Inv.	UNA/PADI
Caballero, Wilfredo	Inv.	Director Ejc. Inv.	
Arroyo, Oscar	Ext, Sierra	Director Ejec. Ext. Lider Prog.Sierra	Asesor INIAA
Nu ez, David	Ext, Comunic	Director Ejc. Ext. CIPA/Puno	Asesor INIPA
Guardia Mayorga	Ext.		
Arizola, Jose	Ext Cipa Hcyo	Director CIPA INIAA Huancayo	INIAA/Lima
Estrada, Jose	Ed./UNA	Recursos Humanos CAPAC/Dir. Prog. Grad. UNA	
Castro, Dante	Ed	Recursos Humanos CAPAC	Asesor INIAA
Manrique, Antonio	Ed, UNA	Escuela Graduados UNA, Director	Rector UNA
Ezeta, Fernando	Papa,CIP	Co-lider PN Papa	Funcionario CIP
Scheusch, Federico	Maiz, ATT	Co-lider PN Maiz	Asesor FUNDEAGRO
Sevilla, Ricardo	maiz	Prog. Maiz UNA	Asesor/INIAA
Calderon, Guido	cereales		
Valladolid, Angel	Fundetrigo Leguminosas	Lider PN Granos Lider PN Leguminos.	Director FUNDETRIGO PN Leguminosas - Chincha
Chumbe, Victor	Agroeconomia	Analista/Agroecon.	(e) Agroeconomia
Paz, Jose	Agroeconomia	Economista/Agroeco.	Econmista/Agroec.
Villachica, Hugo	Selva	Co-lider Prog.Selva	Co-Lider Prog.Selva
Tapia, Mario	Sierra	Co-lider Prog.Sierra	Co-Lider
Prog.Sierra			
Bazan, Rodolfo	Laboratorios	Capacit. Laboratorios	UNA Laboratorio
Velasco, Eila	R.Geneticos	Lider Prog. Recursos geneticos	idem
Diaz, Jose	Man In.Plag	Lider Prog. Manejo Ing. Plagas	idem
Wiese, Alejandro	Serv.Analitic.	Asesor Metodos Cuantitativos	idem
Robles, Fausto	EE Privada Ica.	Director	Asesor

continuacion.....

NOMBRE	AREA	POSICION ANTERIOR /IEE	POSICION ACTUAL
Bandy, Dale	NCSU/Selva	Jefe, Mision NCSU	idem
Openshaw, Martin	NCSU/EXT/ COMUNIC	Asesor Extension a largo plazo NCSU	idem
Bohl, Carlos	Banco Mundial	Coordinador Banco Mundial - Proyecto INIPA	Asesor FUNDEAGRO
Masuda, Rodolfo	BID	Coordinador Proyecto	Apoyo Institucional INIAA INIAA
Rupprecht, Erhardt	AID	BID/INIPA Jefe, OARD/USAID	idem
Griego, Rudolfo	AID	AGR, AID	Jefe Agr. USAID
Mann, Fred	TTA	Asesor AID	Consultor MIAC/TTA
Larrea, Nelson	Sector Privado	Gerente CNP Arroz/ONA	idem
Iglesias, Julio	Sector Privado	Gerente CNP Maiz/ONA	idem
Lazo, Juan	Sector Privado	Director FONAGRO Chincha	idem
Galindo, Eloy	Sector Privado	Jefe, Asistencia tecnica FONAGRO	idem
Angeles, Roberto	Min.Agric.	Vice-Ministro AGR	Asesor Senado
Osores, Manuel	Ext.Tarapoto	Director Ext. CIPA Tarapoto	Director CDR/ Tarapoto
Gomez, Daniel	E.E. Tarapoto	Ministerio de Agri- cultura.	Director, E.E El Porvenir
Cancino, R.	Invest./Tarap.	Investigador Maiz	idem
Baez, Cesar	Invest./Tarap.	Investigador Fitopa- tologia	idem
Alejandria, Miguel	Invest./Tarap.	Investigador Arroz	idem
Sullca, Juan	Invest./Tarap.	Inve.Prog.Selva	idem
Paredes, Bernardo	Ext. Tarapoto	Agente Extension Rioja	Agente Ext. CDR, Tarapoto
Lastra, Jose	E.E. Chincha	CIPA/Amaz.	Director E.E. Chincha

Reuniones de Grupo con investigadores, extensionistas y productores en Tarapoto y Chincha.