5140217-(2)

PD-AAD-883-B1 Appendix 6A, Ch 6 Page 4 (TM 3:1)

AGENCY FOR INTERNATIONAL DEVELOPMENT

# PROJECT PAPER FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE ("X" appropriate box)
[ ] Original [ ] Change [X] Add [ ] Delete

PP

DOCUMENT CODE 3

2. COUNTRY/ENTITY: COLOMBIA

3. DOCUMENT REVISION NUMBER: 1

4. PROJECT NUMBER: 514-~~0217~~ 0209

5. BUREAU: a. Symbol: LA; b. Code: 3

6. ESTIMATED FY OF PROJECT COMPLETION: FY 78

7. PROJECT TITLE - SHORT (stay within brackets): CARE Risk Sharing Investment OPG

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a. INITIAL mo. 6 yr. 77; b. FINAL FY 77

9. ESTIMATED TOTAL COST ($000 or equivalent, $1 = )

| a. FUNDING SOURCE | FIRST YEAR FY 77 b. FX | c. L/C | d. Total | ALL YEARS e. FX | f. L/C | g. Total |
|---|---|---|---|---|---|---|
| AID APPROPRIATED TOTAL | 113 | | 113 | 113 | | 113 |
| (Grant) | ( 113 ) | ( ) | ( 113 ) | ( 113 ) | ( ) | ( 113 ) |
| (Loan) | ( ) | ( ) | ( ) | ( ) | ( ) | ( ) |
| Other U.S. 1. | | | | | | |
| Other U.S. 2. | | | | | | |
| HOST GOVERNMENT | 36 | | 36 | 72 | | 72 |
| OTHER DONOR(S) | 35 | | 35 | 154 | | 154 |
| TOTALS | 184 | | 184 | 339 | | 339 |

10. ESTIMATED COSTS/AID APPROPRIATED FUNDS ($000)

| a. Appropriation (Alpha Code 18) | b. Primary Purpose Code | c. Primary Tech. Code | FY 77 d. Grant | e. Loan | FY ___ f. Grant | g. Loan | FY ___ h. Grant | i. Loan | ALL YEARS j. Grant | k. Loan |
|---|---|---|---|---|---|---|---|---|---|---|
| FN | | | 113 | | | | | | 113 | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| TOTALS | | | 113 | | | | | | 113 | |
| 11. ESTIMATED EXPENDITURES | | | 113 | | | | | | | |

12. PROJECT PURPOSE(S) (stay within brackets) [ ] Check if different from PID/PRP

To improve yields; increase returns; field test and institutionalize risk sharing investment techniques to stimulate new technology adoption.

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

[ ] Yes [X] No

14. ORIGINATING OFFICE CLEARANCE

Signature: James Mogellas

Title: James Mogellas, Director USAID/Colombia

Date Signed: mo. 04 day 06 yr. 76

15. Date Received in AID/W, or For AID/W Documents, Date of Distribution: mo. day yr.

AID 13:0-4 (7-76)

# RISK-SHARING INVESTMENT PROGRAMS FOR STIMULATING NEW TECHNOLOGY ADOPTION

CARE-COLOMBIA

March, 1976

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=======: ===

"Risk-sharing investment programs for stimulating new technology adoption" is a method which encourages small farmers to fully adopt technologies implying higher capital inputs than they currently employ. This adoption substantially increases their probabilities for increased yields as well as greater profits although at the same time it increases their feeling of "risk".

By sharing the risk among project participants, substantially higher adoption rates can be assured than are currently achieved by other more commonly used methods.

## I. PROJECT PURPOSE AND DESCRIPTION

### A. Goals

1. To increase the income for participating small farmers.

### B. Purposes

1. Achieve the institutionalization of the techniques embodied in risk-sharinginvestment programs for stimulating new technology adoption.
2. Carry out the field testing and necessary adjustments of the techniques of risk-sharing investment programs first developed for corn and onion producers in Caqueza, Cundinamarca.
3. Improve yields for specific selected crops in target geographic areas.
4. Increase returns to investment by participating small farmers.

### C. Outputs

1. Technicians trained in techniques embodied in risk-sharing investment programs.

2. Small farmers trained in techniques embodied in risk-sharing investment programs.

3. Small farmers use techniques embodied in risk-sharing investment programs.

4. Increased adoption rates for recommended "package of practices" for specific crops in diverse areas of country.

D. Inputs

1. Financial

a. CARE. Cash for material inputs for field trial implementation. This input will be made available on a short-term basis to small farmer groups for material inputs (fertilizer, improved seed, insecticides, etc). Value of input US$86, 892.oo.

b. Small farmer participants. The value of their combined land and labor inputs for field trials carried out averages US$175.oo per hectare. Total value of inputs US$35, 000.oo.

2. Technical

a. CARE. Project organization, monitoring, evaluation. Value US$10, 000.oo

b. ICA. Project implementation. Including local staff and ICA national advisor. Value US$ 71, 650.oo.

c. CIID. Project evaluation. Value US$5, 000.oo

3. Training

a. CARE. Participation in non-formal and informal education. Value US$4,108.oo.

b. ICA. Participation in non-formal and informal education. Includes salaries paid to course participants as well as salaries for technical personnel. Value US$7,150.oo.

Training inputs:

Training will be of two sorts, non-formal and informal (on the spot).

Non-formal training will consist of 10 training courses per year for an estimated 100 small farmers. These courses are expected to have an average cost of US$25.oo per campesino per course for a total cost of US$2,500.oo

Also expected to be held are 10 courses per year for technicians participating in the program for US$3,750.oo per year training costs.

Informal training will be offered during field days. Key information on new technologies will be disseminated and supplemented through programmed technical assistance visits. This value is estimated to be US$5,000.oo per year.

Resume of total project value:

| | CARE | CIID | ICA | Small Farmers |
|---|---|---|---|---|
| Financial | 86,892 | | | 35,000 |
| Technical assistance | 10,000 | 5,000 | 71,650 | |
| Training | 4,108 | - | 7,150 | |
| Total | 100,000 | 5,000 | 78,800 | 35,000 |

## General Description of Project

This project consists of the implementation of the techniques of risk-sharing investment programs for stimulating new technology adoption which have been successfully carried out with both corn and onions in one area of the country (Caqueza, Cundinamarca) in order to make these techniques applicable on a country-wide basis.

It is expected that small farmer participants incomes will increase through this project. Both yields per unit of land and production costs are likely to increase. However, the result will be a net increase in small farmer income.

A typology could be drawn showing adoption rates for new potentially profitable technologies by the small farmer. If such a typology were drawn, it would show approximately the following:

| Type of Credit Availability | % adoption new technology |
|---|---|
| 1. Farmer using his own capital, having access to no technical assistance. | 2 |
| 2. Farmer with credit from Caja Agraria with no technical assistance. | 15 |
| 3. Farmer with credit from Caja Agraria with technical assistance from ICA. | 60 |
| 4. Farmer with credit, technical assistance, and risk-sharing techniques. | 95 |

It is extremely important to Colombia to have the small farmer, the main provider of many key crops required for domestic consumption, as well as the principal focal point for current Colombian socio-economic development programs (Rural Integrated Development and the National Nutrition Plan among others), adopt the new technologies developed by ICA which allow increased productivity and potentially increased income.

CARE feels that the techniques embodied in risk-sharing, when expanded from their initiation in Caqueza, and adjusted to various crops in distinct geographical areas, will be of great importance in encouraging successful rural development activities in Colombia.

Since 1953 ICA has developed agronomic technology, at its agricultural research stations, for most of the crops which small farmers produce in Colombia. However, not all of this technology fits all of the ecological regions where small farmers eke out a living from the production of these crops. Some of the reasons for this failure are technical and agronomic, while others are caused by sociological constraints.

For this reason, in 1971, ICA established a rural development program with the basic objective of adjusting the new technology to local conditions prior to extending definitive recommendations. The rural development projects were designed to test and adjust new technologies for each region, and then enter into an analytical phase to study the socio-economic restrictions which

limit the potential for adopting the new technology on the part of small farmers. This process is presently on-going in several project areas. Among these are the Cundinamarca, Santander (Province of García Rovira), North Cauca and Cordoba project areas.

The major socio-economic restrictions which have been identified from field investigations and analysis to date are as follows:

1. Labor scarcity occurs throughout the Andean range during the months of corn seeding and weeding. (Generally April, May). This means that any technology which requires significant labor increases during these months is likely to encounter farmer resistance and potential rejection.
2. Cash for investment in new technologies is quite limited. Hence, readily available credit is necessary for almost any technology shift.
3. Access to capital markets is limited. Most lending institutions (both formal and informal) require some form of collateral, such as land title, co-signer, record of credit worthiness, etc. The smaller the farmer's patrimony, the more difficult it is to provide this aspect of a credit arrangement.
4. Lastly, risk, as measured by an increase in earning variance, absolute deviation, expected loss value, etc., increases when capital investments rise. If the small farmer operates at a risk efficiency level dependent upon his resource and wealth base, he may not be able to absorb more risk

without some kind of countervailing compensation. It should be noted that this risk measurement includes risk due to climatic and soil variation, input and output price variation, and institutional uncertainty with regard to input supply, the timing of technical assistance, and the availability of a market.

Given the above analyzed major constraints (labor scarcity at peak times, limited cash, lack of readily available credit, and limited risk absorption potential), small farmers have shown relatively little susceptibility to suggested changes in their currently practiced technologies.

However, as the result of three years of new technology adjustment in Caqueza (an ICA project which has received CIID technical assistance) plus several studies on socio-economic limitations to new technology adoption, the following schemata has emerged for guiding the design of a buffer institution (interfaced between the small farmer and the existing infrastructure) to deal with labor and capital scarcity, and production as well as institutional risk problems. The scheme involves the creation of an Investment Plan which offers minimum security to the farmer's own scarce capital resources.

In simplified form the investment plan:

a. offers credit in kind (fertilizer, pesticides and seeds) to the small farmer without demanding collateral,

b. charges an inscription fee,

c. allows the farmer to keep an amount equivalent to this investment in his own resources,

d. requires a repayment equivalent to the value of the inputs only after the initial production (c above) has been deducted, and

e. Leaves the farmer the "profit".

The value of "d" above is only collected according to the production level. For example, if "c" is equal to 800 kg. per hectare (the value for the corn plan) and "d" in a particular case equals 900 kgs., and the farmer produced 1,000 kgs., he pays 200 kilos in corn to the Plan. This, in fact, represents the farmer's insurance.

In addition, the Plan has offered technical assistance for the recommendations related to the new technology.

Credit for corn production has operated in the Caqueza project for four years. Under the ICA-Caja Agraria-AID credit program, adoption rates for the recommended technological "package of practices" was only 35% in 1972 and 50% in 1973. Fertilizer adoption without supervised credit in 1973 was only 7%. Meanwhile, adoption rates using supervised credit plus the insurance techniques above described was 95% in 1974 and 97% in 1975.

In a similar onion credit plan, begun in 1975, adoption with the insurance techniques was virtually 100% and adoption with supervised credit alone

but without security (again using weight averages) was only 60%.

These vastly improved adoption rates, when risk-sharing insurance techniques are included, make this technique of great potential importance, since the adoption of the total "package of practices" increases the small farmers' earnings.

The system which has been developed for establishing an Investment Plan requires six fundamental steps:

1. A general analysis of the agronomic feasibility of the crop under consideration and its potential adaptability to the region. This analysis is prepared by the project agronomist.
2. An economic pre-test of the economic feasibility of the crop based on discussions between project staff and farmers growing the crop under local conditions.
3. A budget analysis survey consisting of at least 50 interviews is carried out with farmers growing the crop under local conditions. This survey determines the activities the farmer currently employs and his corresponding material and labor costs, his yields, returns to production factors and net gains.

   Three key points come from this survey:

   a. Labor requirements for individual inputs.

   b. Mid-point of the best quartile which is then used as a baseline for

design of the field tests for the new technology for each material input (seed variety, fertilization, density, weed control, and pest control).

c. Relative profits for different crops.

4. One season of regional field trials to test the recommendations suggested in the survey analysis (upper and lower decimal analysis) adjusted by the project staff's general agronomic knowledge of the crop and the region.

5. From the above information gathered, one calculates the net profit distribution from which the probabilities of "c" (farmer investment) and "d" (repayment expected) can be derived. With these values, repayment models can be established and their corresponding return rates calculated. In addition, returns to farmer's own resources can be estimated.

6. The last step in this process is to determine what type of institutional structure should be designed for each group to manage each plan. For this project it is suggested that various schemes be tested in order to find a model which could eventually be financed through the existing financial sector in Colombia. Four types of farmer groups, it is herein proposed, could be utilized, namely: (1) informal groups, (2) communal groups, (3) cooperatives, and (4) Community Enterprises. Four project areas have been tentatively chosen by ICA for the project. The table below presents the design matrix. It is estimated that it should be possible to carry out as many as 8 investment plans in each project area.

Tentative matrix design

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| A. Project area | Cundinamarca | Santander | Cauca | Cordoba |
| B. Farmer groups | Informal | Informal | Informal | Informal |
| | Cooperative | Cooperative | Communal | Community Enterprise |
| C. Suggested crops | corn | corn | corn | corn |
| | onions | onions | - | - |
| | peppers | peppers | - | - |
| | tomato | - | - | - |
| | peas | - | - | - |
| | lentils | - | - | - |
| | head lettuce | - | - | - |
| | - | - | red beans | - |
| | - | leaf lettuce | - | leaf lettuce |
| | - | - | soya | - |
| | - | - | - | yams |
| | - | - | carrots | carrots |
| | - | - | upland rice | upland rice |
| | beets | - | - | - |
| | - | cucumbers | cucumbers | cucumbers |
| Total number crops | 8 | 5 | 6 | 6 |

Other crops will be added to the matrix as the project progresses.

The program will be supervised at the national level jointly by an ICA agronomist and an agronomist seconded by CARE. The ICA project director is expected to have some experience in economics as well as agronomics.

At the local level, the project will be directly supervised by ICA field personnel, who will receive periodic visits and training by the national ICA and CARE project directors.

General Conditions expected at the end of project.

1. The most effective agro-economic package of recommendations for new technology in the production of eight crops in each of the four regions.
2. Data concerning the relative efficiency of each institutional form to deal with groups of farmers (informal, communal, community owned enterprises, acción comunal (community action groups) in the management of risk-sharing production systems.
3. Two seasons of implementation of project design.
4. Increased small farmer adoption rates significantly greater than those achieved in past supervised credit programs for the package of recommended practices for the crops involved.
5. Small farmer participants will receive additional incomes generated on the basis of this project of not less than 300 pesos/month (US$10.00 per month).

## II. PROJECT BACKGROUND

This section can be divided into several parts as follows: general description of ICA activities, project focus, a brief description of the small farmer, and specific activities required to increase small farmer production.

A. General Description of ICA Activities

After an extensive study of integrated rural development programs in other parts of the world, the Colombian Agricultural Institute (ICA) decided early in 1971 to restructure its own activities in this field, based on the model being used in the Puebla Project in México. The approach differed somewhat from Puebla, where most of the emphasis was on corn production, in that the Colombian areas selected for the first Integrated Rural Development projects all involved complex intercropping systems on small farms. Furthermore, in addition to the emphasis on agronomy, the Colombian program incorporated inputs in Animal Science and Home Economics.

The Colombian program commenced with four pilot projects. In the past four years the number of projects has expanded to 22, covering a significant part (approximately 30%) of the small farming area and small farming population of the country.

The same general development techniques have been embodied in the DRI (Rural Integrated Development) sponsored by World Bank, Inter-

american Development Bank and CIDA. The new DRI projects will use, at least initially, the ICA project areas as a geographic and organizational base for activities.

In the last twenty years, a great number of efforts have been made to accelerate rural development in the Third World through the introduction of new techniques in agriculture and animal production. This approach has been stimulated by the encouraging progress made in the development of new technology which increases agricultural production capacity. Nevertheless, although the adoption of this new technology by small farmers has been a major objective of rural development programs, in practice the success achieved has been rather limited. Recent thinking has suggested that low adoption rates may be associated with the new technology being inappropriate for small farm situations. In particular, it may be erroneous to seek only to maximize production per hectare, and to consider that other production factors exist in unlimited quantities and at fixed prices. Such an approach assumes that the economic, social, cultural and political infrastructure can and will automatically adjust to the requirements of the new technology. In practice this does not occur.

A good example is high production corn technology. With the use of hybrids, fertilization, increased plant densities, insecticides and pesti-

cides, corn production can easily be tripled over average yields currently achieved. However, adoption rates can continue to be disappointingly low.

More recently an alternative approach has gained some acceptance, namely that of adjusting production technology to the social and economic systems currently encountered in rural areas. This approach has emerged as a result of the recognition that modern production technology (especially fertilization and mechanization) may result in increasing the disparity in welfare levels between commercial and traditional farmers, because large farmers adapt to the new technology while small farmers do not, thereby increasing rather than closing the gap.

B. Government Objectives

In Colombia's Five Year Plan as well as the National Nutrition Plan, Colombia's development policy emphasizes the need to achieve a more equal distribution of income, to increase agricultural production and productivity, to create employment opportunities, to increase exports and industrial development, and to overcome malnutrition.

These policies are particularly designed to improve the welfare of the lower-half (in terms of income) of the population. Sixty-five to seventy-five percent of this target population are rural inhabitants, many of whom are small farmers (currently estimated at 700,000 families).

C. Description of the Small Farmer

Schultz has expressed, in his theory of the "efficient but poor" small farmer, that, as currently organized, he is making the most efficient use of his available resources. If this is indeed true, one way of increasing production is to increase proportionally all production factors, while keeping production techniques constant. This is in fact unfeasible since the small farmer's chances of increasing the size of his farm are negligible. Therefore, to increase production it is necessary to increase the productivity of the small farmer's land.

Some generalizations about the small farmer are in order, especially as regards the following aspects of his productivity:

1. Land use.
2. Labor utilization and availability.
3. Capital utilization and availability, cost of credit.
4. Efficiency of resource use.
5. Risk.
6. Acceptance of new technologies.

These generalizations are made largely on the basis of data from Caqueza, Cundinamarca, collected by ICA-CIID in its jointly sponsored project.

1. Land use. - The small farmer uses his land intensively for agriculture although the ecology and topography of the area are not ideal for agri-

cultural production. Alternative uses of land (livestock or fallow) are minimally used. Inter-cropping is common. As a means of savings and a cushion against bad years, the small farmer is likely to have a few pigs or chickens, a milk cow or two, and possibly a small garden.

2. Labor utilization and availability. - During certain periods, there exists an excessive demand for day laborers. In contrast to this, analyses of labor use show that there is, on a yearly basis, 57% employment of the available labor force. Returns to labor are 25% above opportunity costs (30 pesos/day laborer'73).

3. Capital utilization and availability, cost of credit. - Availability of capital is generally low. The present crop distribution pattern in the area is more likely attributable to lack of cash for investment rather than to deficiencies in labor supply.

The cost of credit, particularly to the small farmer, is far greater than is generally assumed. The Caja Agraria charges a nominal annual interest rate of only 13% (1973). However, hidden costs of 9% (stamps, legal fees, hospitality expenses, etc) and 14% for time lost and travel, mean a total real cost of 36%.

Most credit does not come from the Caja (27%) but rather from in -

formal sources (73%). This is perhaps true because informal sources offer more flexibility. This supports the contention that the returns to capital are higher than their opportunity costs because otherwise money would not be available in the informal credit markets.

4. Risk. - The small farmer is always confronted with a number of uncertainties which lie largely outside his control. He appears to specifically analyze two aspects of risk. In some way, he compares expected net gain as related to his cash expenditures to the variance of this gain, for different production activities. He then relates this comparison to his risk absorption capacity which is based on his wealth and income level.

As mentioned earlier, there are several ways to measure risk levels (loss function, production variance, absolute standard deviation, focus loss, etc) but no matter which is used, risk increases as cash expenditures increase. It is practically self-evident that cash expenditures are increased by virtually any new technology.

5. Acceptance of new technologies. - The small farmer is generally unwilling to accept changes which raise his cash expenditures. Even with technical assistance (supervised credit) new technologies adoption has rarely been in excess of 50% of the target population. Experience has shown that in Cáqueza there is resistance to adopting new technologies when cash

costs, and hence, concurrently, risk levels, are required to increase.

D. Specific Activities Required to Increase Small Farm Production

Some of the required activities include the generation or identification of high yielding technologies, the technical assistance required to apply these technologies, the establishment of a system of credit which adequately covers production and some institutional risks, and the creation of an infrastructure to effectively supply agricultural inputs and product marketing services.

The selection criteria for alternative production systems must go further than simply generating a production package which maximizes kilograms per hectare or net gain per hectare. It must also include an analysis of risks, input costs, and labor requirements of the new technology compared to the traditional system.

The Caqueza Model

In general, the returns from new technology are high enough to support production programs which cover the small farmer against the risks associated with the application of this new technology while, at the same time, they generate a return to the invested capital sufficient to pay for its real cost, as well as returning an increased profit to the small farmer.

The Cáqueza Project staff (ICA-CIID) designed an experimental credit and risk-sharing plan which would reduce the risks associated with the adoption

of high input recommendations for corn production (See attachment #1).

In 1974 twenty-seven farmers collaborated with the staff in carrying out this plan on an experimental basis. The results obtained showed that the plan partially reached its expected potential for increasing corn production and profitability. The experiment was expanded in 1975, also with significant success.

This suggested, in turn, that production plans for crops with higher returns to invested capital (such as horticulture crops) could be even more attractive. It was on this basis that an onion project in the same Cáqueza area was embarked upon. The onion plan began in 1975, in Cáqueza, with 37 farmers and a total of 3,2 hectares planted. The objective for this plan was to test the techniques used for the corn plan on the potentially more profitable horticulture crop-onions-.

## III. PROJECT ANALYSIS

### A. Economic Effect of Project

Technologies have been devised which can double or even triple the yields currently received by traditional small farmers. Some of these technologies also increase returns to capital investments, thereby increasing the total earnings of the small farmer.

However, all of these technologies are of little value without adoption by

the farmer himself. The studies carried out in Cáqueza show that adoption rates were consistently low even when the total "package of practices" was made available to the farmer (including technology, credit, and technical assistance). Only when the factor of risk was also taken into consideration could the adoption rate be significantly improved.

In the case of the corn plan in Cáqueza, the farmer with an average yield involved in the plan had profits 10 times that of the average non-participating farmers. Even the least successful had returns about 4 times those of non-participating farmers. (See CIID Informa Vol. 4, #4, page 10).

Studies have also shown that the farmer who adopts a portion of the new technology without accepting the whole "package of practices" is frequently worse off than if he had remained at his current level of technology. (See Descripción de factores asociados con bajos rendimientos de maíz en fincas pequeñas de tres departamentos de Colombia, Nohora Ruiz de Londoño and Per Pinstrup-Andersen, CIAT, Sept. 1975, page 8).

The economic effect of this project, therefore, is to significantly increase adoption rates for new technology and therefore the profit to the participating farmers.

A concurrent benefit may be to economically strengthen the group which functions as sponsor to the Plan at the project specific level. Thus, in

the case of Cáqueza, the cooperative which acted as sponsor for the project, supplying required inputs, was a concurrent beneficiary of project success.

B. Technology to be Used

1. The recommended "package of practices" for each crop will be prepared and field tested. In the case of corn, the technology for Cáqueza consisted of the following new practices:

CORN

| Item | New Practice | Traditional Practice |
|---|---|---|
| (1) Seed | Improved hybrid or variety | Locally available seed |
| (2) Density | 37,500 /hectare | 18,000/hectare |
| (a) rows per hectare | 100 | 90 |
| (b) holes per 100 meters row | 125 | 90 |
| (c) Plants per hole | 3 | 3 |
| (3) Fertilization | | |
| (a) Initial )(10-30-10) | 200 kgs | 0 |
| (b) Side-dressing | 25 kgs | 0 |
| (c) Second side-dressing | 125 kgs | 0 |
| (4) Disease control | | |
| (a) Cob worm | control | no control |
| (b) Cogollero | control | no control |

| Item | New Practice | Traditional Practice |
|---|---|---|
| (c) Trozador | control | no control |
| (4) Weeding (times per harvest) | 2 | 4 |

2. The possible recommended "package of practices" (subject to increased analysis and field testing) as well as currently practiced technologies are as follows for onions.

Currently in Cáqueza, with traditional available credit, onion cultivations use "Ocañera" bulbs for propagation. The onion growers adopting the Plan used a seed-bed with subsequent transplant and used the ICA recommended high producing varieties of Red Creole, Texas Granex or Yellow Granex (Bermuda). Yields increased from an average of 10 tons/hectare to approximately 20 tons average production. (Estimated production because total harvest is unfinished).

These technologies have been amply tested at the experimental farm level and also on a "pilot" basis yet their rate of adoption by small farmers has been disappointly low.

C. Socio-cultural Factors

The Colombian peasant is efficient within the confines of his resources given his ability and willingness to withstand risk. Therefore, in order to increase his productivity and consequently his earnings, some adjustments

must be made in his current technology. This project is designed to alter his ability to withstand risk, thereby opening the door to increased productivity and profit.

The project therefore strengthens the beneficiaries' capability to earn an increased income, improve his productivity and increase his spending power.

No socio-cultural factors are seen as deterring the effective implementation of this project.

D. Project Relationship to Guidelines

As discussed in earlier sections, the project fits the guidelines well. Specifically:

1. It is designed to work with a portion of the "poorest majority".
2. It demands extensive local counterpart participation.
3. It requires Colombian national assistance and commitment.
4. It has potential widespread applicability throughout Colombia.
5. It is innovative in nature.
6. It is part of an active on-going project.

E. Institutionalization of Project

The technologies expressed in this project have been successfully implemented for a single crop (corn) in a single geographical area of Colombia (Cáqueza, Cundinamarca). Subsequent efforts with onions in the same area

are progressing satisfactorily, although final results are not yet available.

This project will expand the currently relatively restricted scope of the project. This will allow the techniques to be tested at a truly "demonstration" rather than "pilot" stage. By "pilot" we mean a project which is carried out at a very small, well controlled, and not necessarily replicable level. This stage is of course necessary to begin to test promising technologies, but the "demonstration" stage, where the above mentioned restraints are relaxed, is necessary in order to effectively test the project's replicability on a larger scale.

In order to encourage institutionalization, CARE has deliberately chosen a wide variety of crops and considerable geographic diversity. The only constant in site choice is that there be large number of small farmers in the area. This makes it more likely that the results, if successful, will have nationwide applicability.

CARE believes that this technology will become institutionalized. How quickly this happens depends on how successful and publicized the first demonstrations are. CARE believes that within three years, the basic technological knowledge will be sufficiently widespread to assure institutionalization.

As the project becomes better known, Colombian banks, particularly the

Caja Agraria and Banco Popular, should move in to expand the program well beyond its small beginning. Already the Banco Popular has expressed considerable interest in risk-sharing strategies. They are eager to see the results from this project.

F. The Role of Women

In Colombia in most of the areas where small-farmer predominate, women are key to the financial well-being of the family. They work for substantial portions of the day in the fields along with their husbands and children, as well as have a key role in the marketing of home-grown produce.

This project is designed to improve the role of women by allowing a more profitable return to their time spent in the fields, as well as to improve their general welfare through the improvement of family income for project participants.

It is expected that many of the people trained in non-formal and informal training programs will be women since they are so directly involved in project implementation.

## IV. PROJECT DESIGN AND IMPLEMENTATION

The operation plan is as follows:

| Item | Approximate date |
|---|---|
| 1. Project proposal prepared | Feb. 1976 |

| Item | Approximate date |
|---|---|
| 2. Discussions and approval by AID | April 1976 |
| 3. Contracts CARE and ICA | June 1976 |
| 4. Personnel hired seconded to project | June 1976 |
| 5. Personnel training | June 1976-July 1976 |
| 6. Definite site selections carried out | July 1976 |
| 7. Definite crops selection carried out | July-September 1976 |
| 8. Package of practices for each crop, site prepared | July-Sept. 1976 |
| 9. General analysis for agronomic feasibility of crop | July-Sept. 1976 |
| 10. Economic pre-test for each crop | July-Sept. 1976 |
| 11. Summary budget study for each crop | July-Sept. 1976 |
| 12. Season of regional field trials for each crop | October 1976 |
| 13. Calculate net profit by crop. | Feb.-March 1977 |
| 14. Project analysis (establish repayment models, calculate farmers returns to individual resources, etc) | Feb.-March 1977 |
| 15. Season of project implementation | March 1977 |
| 16. Project analysis by geographic area and specific group | July-Sept. 1977 |
| 17. Make detailed modifications on methodology on as needed basis | July-Sept. 1977 |

| Item | Approximate Date |
|---|---|
| 18. Repeat project implementation for second crop season | Sept.-Oct. 1977 |
| 19. Disseminate findings to relevant national entities | Oct. 1977 onwards |
| 20. Season of project implementation | Oct. 1977 |

Project Cost Estimates

For a single vegetable crop in a single geographic area, with a single replication for a one hectare plot of land, estimated costs and their expected source of funding are as follows:

ONIONS

(Funding Source in Col. pesos)

| Expense | Farmer | ICA | CARE |
|---|---|---|---|
| 1. Land rental | 1,000.oo | | |
| 2. Land preparation | | | 1,500.oo |
| 3. Labor costs | 11,605.oo(*) | | |
| 4. Input costs | | | 11,025.oo(*) |
| 5. Project supervision costs | | 5,300.oo(*) | |
| 6. Overhead adm. costs | | 1,500.oo(*) | 2,000.oo(*) |
| | 12,604.oo | 6,800.oo | 14,525.oo |

(*) See following specific details

3. Labor costs (55 pesos/day-laborer); expressed in Colombian pesos

| | Days | Value |
|---|---|---|
| a. Preparation/maintenance seedlings | 4 days | Col.$220.oo |

| | Days | Value (Colombian pesos) |
|---|---|---|
| b. Transplant seedlings | 40 days | 2,200.oo |
| c. Seed-bed preparation | 31 days | 1,705.oo |
| d. Fertilizer application | 8 days | 440.oo |
| e. Insecticide/fungicides application | 15 days | 825.oo |
| f. Herbicide application | 3 days | 165.oo |
| g. Irrigation | 36 days | 1,980.oo |
| h. Weeding | 24 days | 1,320.oo |
| i. Harvesting/Packing for market | 50 days | 2,750.oo |

4. Input Costs

| | Value (Colombian pesos) |
|---|---|
| a. Seed 2.5 kg -Ps. 940/kg | Ps. 2,350.oo |
| b. Fertilizer - 300 kgs. - Ps. 10/kg | 3,000.oo |
| c. Insecticides - 2 lts -Ps. 75/kg (Malathion) | 150.oo |
| d. Insecticides - 4 lts -Ps. 60/lt (Toxafeno) | 240.oo |
| e. Fungicides - 35 kgs -Ps. 75/kg. (Vitigrone) | 2,625.oo |
| f. Herbicides - 2 kgs. - Ps. 300/kg (Afalón) | 600.oo |
| g. Bags - 180 bags -Ps. 12/bag | 2,060.oo |
| | 11,025.oo |

5. Project supervisory costs (ICA) per field trial (average field trial is 1/2 hectare).

a. 1 supervisory visit /week for 16 weeks

250 pesos/visit x 16 — Col. $4,000.oo

b. 2 preliminary visits for site selections

and participant motivation.

400 pesos/visit x 2 — Col. $800.00

c. Field day - 500 pesos — Col. $500.00

Col. $ 5,300.00

Cost per hectare = Ps. 5,300 x 2 = Ps. 10,600.00

6. Overhead administrative costs

| ICA/CARE | Cost/field trial (in Colombian pesos |
|---|---|
| CARE US$14,108 ÷ 400 field trials (see budget breakdown) | Ps. 1,260.00 |
| ICA US$10,000 ÷ 400 field trials | 900.00 |

Estimated costs and sources of funding for corn are as follows:

| Expense | Funding source: Farmer (Col. pesos) | Funding source: ICA (Col pesos) | Plan through CARE (Col. pesos) |
|---|---|---|---|
| Land rental | 900.00 | | |
| Land preparation | 500.00 | | |
| Labor | 3,000.00 | | |
| Seed | | | 150.00 |
| Fertilizer | | | 3,800.00 |
| Pesticides | | | 200.00 |
| Project supervision | | 5,000.00 | |
| | $4,500.00 | $5,000.00 | $4,150.00 |

## V. RISK - SHARING INVESTMENT PROGRAMS FOR STIMULATING NEW TECHNOLOGY ADOPTION

| | | | FY - 1977 | | | | FY 1978 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Months | US$ salary monthly | AID (to CARE) | Small Farmers | ICA | CIID | CARE | Small Farmers | ICA | CIID |
| I. PERSONNEL AND SALARY BENEFITS(47%) | | | | | | | | | | |
| A.1. Project Director-Agronomist | 12 | 420 | 5,040 | | | | 5,300 | | | |
| 2. Agronomist | 12 | 420 | | | 5,040 | | | | 5,300 | |
| 3. Project implementation personnel (10 people part-time) | | | | | 12,000 | | | | 12,600 | |
| 4. Project Evaluation personnel | | | | | | 3,000 | | | | 3,000 |
| B. Travel Expenses | | | | | | | | | | |
| 1. Travel expenses CARE project personnel | | | 2,475 | | | | 2,475 | | | |
| 2. Travel expenses ICA personnel | | | | | 4,000 | | | | 4,000 | |
| II. TRAINING COSTS | | | | | | | | | | |
| Small farmers and technicians | | | 3,000 | | 5,000 | 2,000 | 3,000 | | 5,000 | 2,000 |
| III. EQUIPMENT AND SUPPLIES | | | | | | | | | | |
| 1. Seed, fertilizer, insecticide, etc. | | | 86,000 | | | | 69,000* | | | |
| 2. Land and labor inputs small farmers | | | | 35,000 | | | | 35,000 | | |
| 3. Ford van or equivalent | | | 5,500 | | | | | | | |
| IV. OTHER COSTS | | | | | | | | | | |
| 1. Vehicle maintenance | | | 1,200 | | 3,000 | | 1,200 | | 3,000 | |
| 2. Office supplies-printing and stationary. | | | 1,000 | | | | 1,000 | | | |
| 3. Postage, telephone and cables | | | 1,000 | | 1,000 | | 1,000 | | 1,000 | |
| 4. Light, water, cleaning services | | | 500 | | 500 | | 500 | | 500 | |
| V. CARE overhead costs 7.5% | | | 7,853 | | | | | | | |
| TOTALS | | | 112,568 | 35,000 | 30,540 | 5,000 | 83,475 | 35,000 | 31,400 | 5,000 |

- Estimated 20% devaluation of peso during fiscal year and bad debts

| Project value year 1 | | 183,108 |
|---|---|---|
| AID | 112,568 | |
| Farmers | 35,000 | |
| ICA | 30,540 | |
| CIID | 5,000 | |

| Project value year 2 | | 154,875 |
|---|---|---|
| CARE | 83,475 | 14,475 |
| Farmers | 35,000 | |
| ICA | 31,400 | |
| CIID | 5,000 | |

| Grand total | | 337,983 |
|---|---|---|
| AID | 112,568 14,475 | 31.9 |
| CARE | 83,475 | 25.2 |
| ICA | 61,940 | 18.6 |
| Farmers | 70,000 | 21.1 |
| CIID | 10,000 | 3.0 |
| | 268,983 | |

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# VI. EVALUATION

## A. Evaluation Justification

Evaluation is a fundamental part of any on-going project. This is especially true for this project, where modifications of the basic pilot project strategy devised in Caqueza are expected and, in fact, eagerly awaited. The project managers do not suppose that the project design, as currently conceptualized, will be maintained in exactly the same form throughout the project's existence.

CARE has a standard format for quarterly evaluations of on-going projects. This format (the Project Implementation and Evaluation Report, or PIE) is prepared yearly, prior to the new fiscal year. It allows quarterly progress evaluations of goals, purposes, inputs and outputs. This allows CARE-Colombia as well as CARE-New York to monitor project progress and to take corrective actions as required.

This evaluation is supplemented by specific observations by the CARE staff regarding any particularly noteworthy observations from predicted progress.

AID will be sent on a quarterly basis copies of PIES as well as specific project observations.

In addition to the quarterly evaluations, progress reports and evaluations according to specific crop and region will be prepared by personnel seconded to the project. This information will be regularly analyzed by the national CARE and ICA project directors as well as the national committee formed by ICA-CARE-CIID personnel. This information will be made available upon request to AID.

Following this page is the PIE proposed for this project.

## B. LOGICAL FRAMEWORK MATRIX

| GOAL | Objectively Verifiable Indicators | Means of Verification | Important Assumptions |
|---|---|---|---|
| 1. To increase the income of participating small farmers | 1. The small farmers adopting risk-sharing technologies are expected to increase their income through participation in the project. An average increase of 300 pesos per month is expected. | 1. A survey of income sources among participating small farmers | 1. There are adequate marketing mechanicisms for production. |

| PURPOSE | EOPS<br>End of Project Status | Means of Verification | Important Assumptions |
|---|---|---|---|
| 1. Achieve the institutionalization of the techniques of risk-sharing investment programs for stimulating new technology adoption. | 1. Caja Agraria and/or other prominent banks have accepted risk-sharing technology on a least pilot, trial basis. | 1. Interviews with officials from Caja Agraria; written reports by CARE. | 1. Risk-sharing technology is shown to be successful for a wide variety of crops in diverse geographic areas. |
| 2. Carry out the field testing and necessary adjustments of the techniques of risk-sharing investment programs first developed for corn and onions in Cáqueża, Cundinamarca. | 2. Fiel testing carried out in four diverse geographic areas for at least eight crops during minimum of two planting seasons. | 2. Field observation by CARE/ICA staff; reporting by resident field personnel. | |
| 3. Improve yields for specific selected crops. | 3. Average increased yield for crops field tested of 30% when comparing "package of practices" with "traditional practices" of area. | 3. Baseline data for average yields using "traditional" methods established prior to introduction new technology. Results of field trials compared to average "traditional" yields. | |

| PURPOSE | EOPS | Means of Verification | Important Assumptions |
|---|---|---|---|
| 4. Increase returns to investment by participating small farmers | 4. Average increased return to investment at least 20% when compared recommended "paekage of practices" with "traditional" practices of area. | 4. Data analysis by project mangers. Information received from ICA field staff on costs/hectare. | |

| OUTPUTS | OUTPUT INDICATORS | Means of Verification | " " |
|---|---|---|---|
| 1. Increase adoption rate of recommended "package of practices" for specific crops in diverse areas of country. | 1. Adoption rates increased from 50% with supervised credit alone to 80% with risk-sharing techniques. | 1. Surveys of credit recipients Caja Agraria compared with groups involved with risk-sharing techniques. | |
| 2. Land put into production according to following tentative schedule | 2. 200 hectares during first year project life. | 2. On site inspections to verify ICA field records. | |
| 3. Small farmers use technologies embodied in risk-sharing investment programs according to following schedule: | 3. # small farmers / semester<br>200 / 1<br>200 / 2 | 3. On-site field inspections to verify ICA field records. | |
| 4. Small farmers trained in techniques embodied in risk-sharing investment programs. | 4. 10 training courses held for 100 small farmers. 50 informal training sessions held for 500 farmers. | 4. Written reports after each formal course. Informal courses monitored by site visitation reports. | |
| 5. Technicians trained in techniques embodied in risk-sharing investment programs | 5. 10 training courses held for 50 technicians. | 5. Written evaluation reports by technician participants. | |

| INPUTS | BUDGET - SCHEDULE US$ | Means of Verification | Important Assumptions |
|---|---|---|---|
| 1. Financial | | | |
| a. CARE (from AID). Cash for material inputs for field trial implementation. | a. 86,000 | a. CARE accounting records for disbursements. | There are no radical departures from percentages established for corn and onions in Caqueza Plan. |
| b. Small Farmers Land, labor inputs for field trials | b. 35,000 | b. Individual project summaries. | |
| 2. Technical | | | |
| a. CARE (through AID). Project organization, field supervision, monitoring, project evaluation. | a. 10,000 | a. Individual project summaries. | |
| b. ICA Field supervision, monitoring | b. 10,000 | b. Individual project summaries. | |
| c. CIID. - Project Evaluation | c. 5,000 | | |
| 3. Training | | | |
| a. CARE (through AID) organization, implementation courses. | a. 4,108 | c. CARE accounting records. | |
| b. ICA Training courses organization, implementation and participation in training. | b. 7,150 | b. Individual project summaries. | |

Attachment 1

## THE CORN PRODUCTION PLAN IN CAQUEZA

In 1974, the Corn Production Plan operated in the following way: Farmers interested in the plan specified the area they wanted to seed and supplied information about soil type, topography and history of the field to be seeded. They also paid an entry fee of US$10 per hectare. Personnel of the Caqueza Project then visited the farm and together with the farmer formulated recommendations as to which variety or hybrid to seed and which type and quantity of fertilizers and insecticides to apply. The farmer received from the project an authorization to receive these inputs from the Cooperative. The Cooperative gave the farmer the seed, fertilizers and insecticides which were required at planting time and at the time of side-dressing. The farmer signed a contract according to which he was to share equally with the Coop. any yield in excess of 800 kg per hectare. If he were to break the contract, the farmer was required to pay a fine of US$10 per hectare, and to reimburse the costs of the inputs he received from the Plan.

TABLE i

Basic Characteristics of the Corn Production Plan in the Cáqueza Project:

| | US$ | |
|---|---|---|
| Entry Fee | 10.00 | |
| Total Investment by Farmer | 107.00 | |
| Total Investment by Plan | 111.00 | |
| Min. yield for Farmer | | 800 kgs. hectare |
| Expected yield for Farmer | | 1700 kgs. hectare |
| Expected yield for Plan | | 970 kgs. hectare |
| Net earnings for Farmer | 175.00 | |
| Net earnings for Plan | 50.00 | |

The cash requirement for a farmer participating in the plan was much less than for those applying the recommendation on their own. Also for risks, the proposal Plan is advantegeous because the probability of obtaining low or zero yields is greatly reduced; the risk to the total investment is similar to that of the actual production system and the risk to cash investment is substantially less than that which the farmer actually accepts with his present production system.

TABLE ii

| | Current Production System | Experimental Plan | Recommendations (without plan) |
|---|---|---|---|
| 1. Cash invested by farmer | 22 | 32 | 149 |
| 2. Net gain by farmer | 61 | 175 | 214 |
| 3. Returns to total investment | 1,68 | 3.42 | 1.90 |
| Returns to land | 3.07 | 4.12 | 5.10 |
| Returns to labor | 2.61 | 5.33 | 6.69 |
| Returns to cash | 3.75 | 6.03 | 2.44 |

The production plan was formulated to reduce cash requirements and risks as well as avoid the possibility that returns to invested cash would be smaller than those obtained from the farmers prevent production system. With respect to this the returns to cash were increased from $3.75 to 6.03 for each dollar invested. This implies that (See table ii) the farmer pays

$39 per hectare for insuring his minimum income when he participates in the plan. Obviously, the farmer who is economically capable of accepting the risk associated with the application of technology will have greater gains if he himself finances the production process. Nevertheless, studies in the Caqueza Project and experiences of project personnel indicate that the small farmer generally prefers to slightly lesses his income in exchange for security.