A Field Study of Fertilizer Distribution and Use in Senegal, 1984: Final Report

by

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Reprint No. 11 1987

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SPECIAL NOTE FOR ISRA-MSU REPRINTS

In 1982 the faculty and staff of the Department of Agricultural Economics at Michigan State University (MSU) began the first phase of a planned 10 to 15 year project to collaborate with the Senegal Agricultural Research Institute (ISRA, Institut Sénégalais de Recherches Agricoles) in the reorganization and reorientation of its research programs. The Senegal Agricultural Research and Planning Project (Contract 685-0223-C-00-1064-00), has been financed by the U.S. Agency for International Development, Dakar, Senegal.

As part of this project MSU managed the Master's degree programs for 21 ISRA scientists at 10 U.S. universities in 10 different fields, including agricultural economics, agricultural engineering, soil science, animal science, rural sociology, biometrics and computer science. Ten MSU researchers, on long-term assignment with ISRA's Department of Production Systems Research (PSR, Département de Recherches sur les Systémes de Production et le Transfert de Technologies en Milieu Rural) or with the Macro-Economic Analysis Bureau (BAME, Bureau d'Analyses Macro-Economiques) have undertaken research in collaboration with ISRA scientists on the distribution of agricultural inputs, cereals marketing, food security, farm-level production strategies and agricultural research and extension. MSU faculty have also advised junior ISRA scientists on research in the areas of animal traction, livestock systems and farmer groups.

Additional MSU faculty members from the Department of Agricultural Economics, Sociology, Animal Science and the College of Veterinary Medicine have served as short-term consultants and professional advisors to several ISRA research programs.

The project has organized several short-term, in-country training programs in farming systems research, agronomic research at the farm-level and field-level livestock research. Special training and assistance has also been provided to expand the use of micro-computers in agricultural research, to improve English language skills, and to establish a documentation and publications program for PSR Department and BAME researchers.

Research publications from this collaborative project have been available only in French. Consequently, their distribution has been limited principally to West Africa.

In order to make relevant information available to a broader international audience, MSU and ISRA agreed in 1986 to publish selected reports as joint ISRA-MSU International Development Paper Reprints. These reports provide data and insights on critical issues in agricultural development which are common throughout Africa and the Third World. Most of the reprints in this series have been professionally edited for clarity; maps, figures and tables have been redrawn according to a standard format. All reprints are available in both French and English. A list of available reprints is provided at the end of this report. Readers interested in topics covered in the reports are encouraged to submit comments directly to the respective authors, or to Dr. R. James Bingen, Associate Director, Senegal Agricultural Research and Planning Project, Department of Agricultural Economics, Michigan State University, East Lansing, MI 48824-1039.

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A FIELD STUDY OF FERTILIZER DISTRIBUTION AND USE IN SENEGAL, 1984: FINAL REPORT

by

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1987

This reprint originally appeared as Travaux et Documents No. 1 entitled "Enquête sur la Distribution et l'Utilisation de l'Engrais au Sénégal, 1984: Rapport Final," published by the Bureau of Macro-Economic Analysis, Senegal Agricultural Research Institute.

This reprint is published by the Department of Agricultural Economics, Michigan State University, under the Senegal Agricultural Research and Planning Project Contract 685-0223-C-00-1064-00 at Michigan State University funded by the U.S. Agency for International Development, Dakar, Senegal.

ISSN 0731-3438

Published by the Department of Agricultural Economics, Michigan State University, East Lansing, Michigan 48824-1039 U.S.A.

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GLOSSARY OF TERMS AND ABBREVIATIONS

ABC -- Agent de base de la coopération (Cooperative Field Worker).

AJAC -- Association de la Jeunesse Agricole de la Casamance (Casamance Agricultural Youth Association).

BAC -- Baccalauréat du Second Degré (obtained after 7 years of post-primary education).

BAME -- Bureau d'Analyses Macroéconomiques (Macroeconomic Analysis Bureau)

BEPC -- Brevet d'Etudes du Premier Cycle (obtained after 4 years of post-primary education).

BNDS -- Banque Nationale pour le Développement du Sénégal (National Development Bank of Senegal)

CEPA -- Centre d'Eclatement de Produits Agricoles, SONAR (Agricultural Products Distribution Center, SONAR).

Chef de carré -- Head of extended family household.

Chef d'exploitation -- Person in charge of the farm unit.

Chef de ménage -- Head of nuclear family.

CNCAS -- Caisse Nationale de Crédit Agricole du Sénégal (National Agricultural Credit Fund of Senegal).

CO.D -- Coordinateur Départemental, SONAR (Departmental Coordinator)

Gérant -- Manager, e.g., of SONAR warehouses.

GP -- Groupement de producteurs (producers group).

ICS -- Industries Chimiques du Sénégal (Chemical Industries of Senegal).

ISRA -- Institut Sénégalais de Recherches Agricoles (Senegalese Institute of Agricultural Research).

OMVS -- Organisme pour la Mise en Valeur du Fleuve Sénégal (Senegal River Regional Development Organisation).

ONCAD -- Office National de Coopération et d'Assistance au Développement (National Office for Cooperation and Development).

Périmètre -- Irrigation scheme, or irrigated area.

PIDAC -- Projet Intégré pour le Développement Agricole de la Casamance (Casamance Integrated Agricultural Development Project).

PIV -- Périmètre irrigué villageois (village irrigation scheme, or project).

PRS -- Projet Rural de Sédhiou (Sédhiou Rural Development Project).

Retenue à la source -- System introduced in 1983/84 in which 20 CFA/kg was withheld from the 70 CFA/kg price paid to farmers selling peanuts through official channels (SONACOS and SONAR). Of this "retenue," 15 CFA/kg was withheld to finance seed, and 5 CFA to finance fertilizer, for the next agricultural season.

SAED -- Société d'Aménagement et d'Exploitation des Terres du Delta et des Vallées du Fleuve Sénégal et de la Falémé (Senegal River Development Organization).

Secco -- Local fertilizer and seed distribution point for SONAR.

Section villageoise (SV) -- Village section, or village-level sub-cooperative.

SIES -- Société Industrielle d'Engrais au Sénégal (Fertilizer Company of Senegal).

Sinistré -- Farmer or area for which a crop failure has been declared.

SODEFITEX -- Société de Développement des Fibres Textiles (Textile Fibers Development Organization).

SODEVA -- Société de Développement et de Vulgarisation Agricole (Agricultural Development and Extension Organization, for the Groundnut Basin).

SOMIVAC -- Société pour la Mise en Valeur Agricole de la Casamance (Casamance Agricultural Development Organization).

SONACOS -- Société Nationale de Commercialisation des Oléagineux du Sénégal (Oilseeds Marketing Organization of Senegal).

SONADIS -- Société Nouvelle pour l'Approvisionnement et la Distribution au Sénégal (Supply and Distribution Organization of Senegal).

SONAR -- Société Nationale d'Approvisionnement du Monde Rural (National Rural Supply Organization).

SSEPC -- Société Sénégalaise d'Engrais et de Produits Chimiques (Senegalese Fertilizer and Chemicals Company).

SV -- Section villageoise (see above).

URCASS -- Union Régionale des Coopératives Arachidières du Sine-Saloum (Regional Peanut Cooperative Union of the Sine-Saloum).

March, 1985

A Field Study of Fertilizer Distribution and Use in Senegal, 1984: Final Report

I. INTRODUCTION

A. Background.

The Government of Senegal is currently in the process of restructuring the fertilizer distribution system, and discussing alternative price and credit policies. There is considerable interest in evaluating the performance of the current transitional system, in order to identify needed improvements. Such an evaluation should be based on a thorough understanding of the structure and economics of the fertilizer distribution system at all levels, and of factors affecting farmers' use of fertilizer.

Recently, the Bureau of Macroeconomic Analysis (BAME) in ISRA (Institut Sénégalais de Recherches Agricoles) has initiated research on the distribution and use of agricultural inputs. While this research program was being prepared in early 1984, the BAME was asked by USAID to undertake a fertilizer marketing study. Such a study was a convenant of the USAID fertilizer import program (AID Project No. 685-0249 dated August 11, 1983), which called for a study to be undertaken by the GOS to: "present a plan for reorganizing the fertilizer marketing system including a study of the respective roles of the private and public sectors. This plan will recommend methods of reorganization for maximizing efficiency, minimizing costs and responding to local farmers needs."

In April, 1984, ISRA and USAID agreed that the study be divided in two parts: (1) a field study implemented by the BAME in the regions of Sine-Saloum, Casamance, and Fleuve; and (2) a national-level study, carried out independently but incorporating the results of the field study, which would analyze the organizational and financial aspects of the overall fertilizer distribution system, and develop concrete proposals for improving the performance and cost-effectiveness of the system. In July, the Ministry of Plan and Cooperation officially requested USAID to provide technical assistance to carry out this study, with a deadline of 30 October, 1984. USAID agreed to carry out part (2) of the overall study.

This report concerns only the field study. The design of the field study began in May, 1984, in anticipation of formal approval and funding by USAID. Under the administrative direction of Jacques Faye, the Interim Head of the BAME, the field study was carried out by the following research personnel:

Eric Crawford--Research economist in the BAME; responsible for overall scientific direction and coordination of the study.

Curtis Jolly--Research economist in the BAME; participation in overall design of the field study, and supervision of the surveys in the Basse and Moyenne Casamance.

Valerie Kelly--Associate research economist in the BAME; participation in overall design of the field study, and supervision of the surveys in the Sine-Saloum.

Philippe Lambrecht--Research economist in the Production Systems Department; participation in overall design of the field study, and supervision of the surveys in the Fleuve.

Makhona Mbaye--Temporary research economist in the BAME; preparation of the annotated bibliography, and assistance with the field surveys in the Fleuve.

Matar Gaye--Temporary research economist in the BAME; assistance with the field surveys in the Sine-Saloum.

Omar Diop--Research assistant, CRA/Djibélor; assistance with field surveys and initial data processing in the Casamance.

Mamadou Sidibé--Research assistant and computer specialist in the BAME; assistance with data processing.

Other personnel included four interviewers in the Fleuve, six in the Sine-Saloum, and six in the Basse and Moyenne Casamance.

Very helpful comments on survey design and organization of the report were received from Lamine Thiam and Jean-François Damon of USAID.

B. Organization of the Report.

The scope and objectives of the report are presented in Section II. Section III contains a discussion of the methodology of the study, including sampling, questionnaire design and testing, recruitment and training of

enumerators, survey supervision, and data processing and analysis. The implementation of the study, including the timetable of survey activities and a summary of problems encountered, is described in Section IV. Sections V, VI, and VII describe the results of study in each of the three regions (Casamance, Sine-Saloum, and Fleuve, respectively). Section VIII presents a brief summary of major findings for the three regions combined, in relation to the objectives of the study. The policy implications of these findings are discussed in Section IX, and suggested topics for further research in Section X.

II. SCOPE AND OBJECTIVES OF THE STUDY

A. Scope.

The study encompassed the following areas:

1. The Fleuve: the perimeters of Lampsar, Boundoum, Colonat, and Ndombo/Thiago, as well as irrigated village perimeters in Podor and Matam departments.

2. The Sine-Saloum: the Departments of Fatick, Gossas, and Foundiougne in the newly created region of Fatick, and the Departments of Kaolack, Nioro, and Kaffrine in the newly created region of Kaolack. (Prior to July 1, 1984, these six departments were grouped into the single region of the Sine-Saloum.)

3. The Casamance: three study zones were selected in the region of Ziguinchor, and three in the region of Kolda (Department of Sédhiou).

B. Objectives.

The original objectives of the study were the following:[1/]

1. To describe the structure, participants, and operating procedures of the fertilizer distribution system in three regions--Casamance, Sine-Saloum, and Fleuve.

[1/] The Scope of Work initially proposed by USAID contained the following statement:

> "[The field study] will be the responsibility of ISRA and will analyze through a survey of farmers in 3 regions (Casamance, Fleuve, Sine Saloum) how the distribution of fertilizer is being made during the 84-85 season. The survey will answer such questions as: what are the problems linked with the system of 'retenue à la source', what are the quantities and qualities utilized, what are the constraints on increased consumption of fertilizer, with the existing farming systems is fertilizer profitable, etc..."

2. To monitor the distribution of fertilizer during the 1984/85 season, including collection of information on the quantity and type of fertilizer distributed in each region, the costs involved, and to whom the fertilizer is distributed.

3. To identify constraints and bottlenecks within the system, such as lack of transport, financing, information, etc., which adversely affect the quantity, quality, and timeliness of fertilizer deliveries to farmers.

4. To identify the major factors affecting farmer decisions regarding the purchase and use of fertilizer, and ways in which the current distribution system acts to encourage or discourage the appropriate use of fertilizer by farmers. Among other aspects, this would include: (1) an examination of the "retenue à la source"; and (2) a summary of the available evidence on the profitability of fertilizer use under farmer conditions.

5. Given the conditions within each region, to propose alternative forms of organization and policies for distributing fertilizer, and to evaluate their advantages and disadvantages from the standpoint of the major participants in the system (suppliers, distributors, cooperatives, government agencies, and farmers). This would serve as an input to the national-level study to be carried out by USAID.[1/]

III. METHODOLOGY

A. Overview.

In general, the methodology consisted of an annotated bibliography, informal discussions with relevant parties, collection of official data from SONAR and SAED, and a formal survey of SONAR and SAED distributing agents, leaders of village sections and producers groups, and farmers. Initial visits were made to each region to finalize the research plan and budget. After initial data analysis, follow-up visits were made to the field to collect additional information and to verify certain findings.

[1/] During the course of survey design, it became apparent that certain of the original objectives could not be addressed satisfactorily in the time available. Specifically, the study did not include any systematic interviews of transporters or traders, nor any assessment of the profitability of farm-level fertilizer use under either current or projected conditions. In the first case, USAID was expected to take primary responsibility for addressing the transport and commerce aspects. In the second case, it was considered impossible in the time available to collect the necessary primary data.

B. Sampling.

1. Overview.

The sampling methodology employed in each region varied as a function of differences in organization of fertilizer distribution. The most notable difference was between the SONAR system based on the retenue à la source (Sine-Saloum and Casamance) and the SAED system based on credit (Fleuve). Issues considered during the design of the sample include:

-- the type of respondent to be interviewed, i.e., the number of levels of the distribution system to study;

-- the size of the sample needed for each study zone and for each type of respondent within a given region, as a function of the objectives of the study, requirements for statistical analysis, and resources available;

-- the method of selection of respondents at each level, e.g., whether random or purposive selection was most appropriate for achieving a representative sample.

During the formal survey, questionnaires were administered at four levels: (1) major distribution points (perimeters in the Fleuve and Centres d'Eclatement de Produits Agricoles, CEPA, in the Sine-Saloum and Casamance); (2) smaller, local distribution points, seccos (in Sine-Saloum and Casamance only), (3) farmer organizations (village sections or producers groups), and (4) individual farmers. For each study zone within each region, distribution points were selected first, followed by a sample of farmer organizations dependent on these distribution points, followed by a sample of farmers belonging to each organization sampled. Portions of the sample were randomly selected, including all farmers and, in some areas, the village sections and seccos. The total sample is shown below.

Summary of total sample.

	Casamance	Sine-Saloum	Fleuve	TOTAL
CEPA's/perimeters	N.A.	5	6	11
seccos	18	20	N.A.	38
village sections	51	48	6	105
producers groups	N.A.	N.A.	37	37
farmers	239	191 a/	145	575

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a/Note: Although 192 farmers were interviewed in the Sine-Saloum, only 191 cases were analyzed. One case was dropped.

The sampling procedure followed in each region is discussed below.

2. Casamance. Three study zones were purposively selected in the region of Ziguinchor, and three in the region of Kolda (Department of Sedhiou). The number and location of the study zones were chosen to reflect the diversity of farming systems in these two areas, in particular the differences between systems emphasizing rice and systems where groundnuts are a more significant component of the cropping pattern.

Three levels of the distribution system were surveyed in each zone: the SONAR secco (fertilizer distribution point), the section villageoise, and the farmer. In each study zone, questionnaires were administered to three seccos, nine sections villageoises (three per secco), and 45 farmers (five per section villageoise).

Seccos were chosen from the list maintained by SONAR in Ziguinchor. An effort was made to select seccos that were relatively close together (to facilitate logistics), but including some that were relatively distant from the main road. It was assumed that the major variability in procedures of fertilizer distribution would occur at the secco and section villageoise level, hence the decision to study three (rather than fewer) seccos, three sections villageoises (SV's) per secco, and five (rather than more) farmers per SV. (**Note:** The original sampling plan called for four seccos per zone, two SV's per secco, and four farmers per SV. Difficulties in locating the secco managers (gérants), and the need to assign two interviewers to survey supervision, led to the reduction to three seccos.)

Forty-five farmers per study zone was considered a large enough sample to permit valid statistical analysis, as well as a feasible number for the interviewers to cover in the 4-6 week period available. (One interviewer had an accident and was able to complete only 14 interviews. The total sample was therefore 239 farmers and 51 SV's.) For each SV, four farmers were chosen randomly from the list of those who sold groundnuts to SONACOS or SONAR last year. The head of the SV was also asked to identify a fifth farmer, a chef de carré who did not sell groundnuts last year and who therefore did not receive fertilizer through the retenue system. It was considered important to interview some farmers who did not participate in the retenue system, to learn why they did not, and what they did (if anything) to obtain fertilizer this year. (**Note:** Some farmers getting fertilizer through the retenue system were not chefs de carré or chefs d'exploitation.

Since they got fertilizer, it was considered valid to interview them. However, in order to obtain useful information from a farmer who did not participate in the retenue, it was felt important to contact a chef de carré, as the most knowledgeable member of the farm household.)

3. Sine-Saloum. Six study zones were considered necessary to cover the size and variability of the Sine-Saloum. One zone was identified for each department, in part because SONAR's distribution network was organized on a departmental basis with each "Coordinateur Départemental" (CO.D.) being responsible for coordinating distribution with the appropriate agencies (SONACOS, SODEVA, the Cooperative Service, etc.) and with administrative authorities at the department and arrondissement level. Also, the procedures followed varied considerably among departments.

Formal questionnaires were administered at three levels.

a) SONAR distribution points. Originally, formal questionnaires were to be administered to a sample of secco managers, since fertilizer was to be distributed to SV's at the 184 SONAR seccos throughout the Sine-Saloum. As the campaign evolved it became clear that the "Centres d'Eclatement de Produits agricoles" (CEPA's) through which fertilizer received from Dakar was forwarded to seccos would also distribute directly to SV's because SONAR was unable to forward fertilizer to more than half the existing seccos. As a result, questionnaires were ultimately administered to a sample of distribution points which included both CEPA's and seccos. All interviews involving SONAR personnel were conducted by the survey supervisor and/or research assistant.

b) Village sections. The village sections (SV's) are groups of rural producers recently created under the direction of the Cooperative Service. As of November, 1984, the Cooperative Service reported 1,179 village sections in the Sine-Saloum. Only 504 of these served as official peanut sales points during the 1983/84 Campaign, yet all were to distribute fertilizer to their members this year. Interviewers administered the questionnaires to the officers of the SV administrative bureaus. At least two officers had to be present; some general members were also invited to these group interviews.

c) Individual farmers. In selecting the sample of SV members, it was intended that 75 percent be farmers who sold peanuts last year and were thus entitled to fertilizer under the "retenue" system. The remaining

25 percent were to be farmers who did not sell peanuts due to crop failure ("sinistré") and therefore had no rights to "retenue" fertilizer. The final sample included 77 percent farmers who received retenue fertilizer (see below). Interviewers administered the farmer questionnaires.

Informal interviews were also conducted both before and after the formal surveys, with a variety of individuals at SONAR, SODEVA, and the Cooperative Service as well as with farmers, traders and SV presidents. These interviews were conducted by the researchers.

The sample distribution points was chosen first, followed by the samples of the sections and farmers. A total of 25 distribution points were chosen, including 20 seccos and 5 CEPA's. Twenty-four were randomly selected and one additional CEPA was purposively selected to ensure 100 percent coverage of CEPA's. The number randomly selected in each department was proportional to the number of existing SONAR seccos. Two SV's were then selected from those served by each randomly selected distribution point, for a total of 48 SV's. Finally, four farmers were selected from each SV for a total of 192 farmers. Figure 1 presents a map of distribution points surveyed and Figure 2 shows the location of the 48 village sections in the sample.

At each level the sampling procedure had to be modified to accomodate the realities of the distribution system. To assure two SV's per distribution point, the few seccos which served only one SV were eliminated. In cases where the randomly selected secco did not actually distribute fertilizer (in some departments relatively few seccos participated), it was determined from which distribution point the sample SV's actually received fertilizer. That point was then included in the sample. This procedure raised the possibility of including more than two SV's served by a given distribution point. As a result, the set of functioning points randomly identified was less than 24. This problem arose in the Departments of Kaolack and Kaffrine; two additionnal seccos were therefore randomly selected from those remaining on the list of functioning distribution points. No SV's or farmers were interviewed for these seccos, since the sample size for these two levels had already been achieved.

The sample represents 23 percent of the seccos which actually received fertilizer and 100 percent of the CEPA's (4 which distributed large amounts of fertilizer directly to village sections and one which delivered only to seccos). Fertilizer distributed directly to SV's from the sampled

Figure 1. SONAR Distribution Points Surveyed — Sine-Saloum

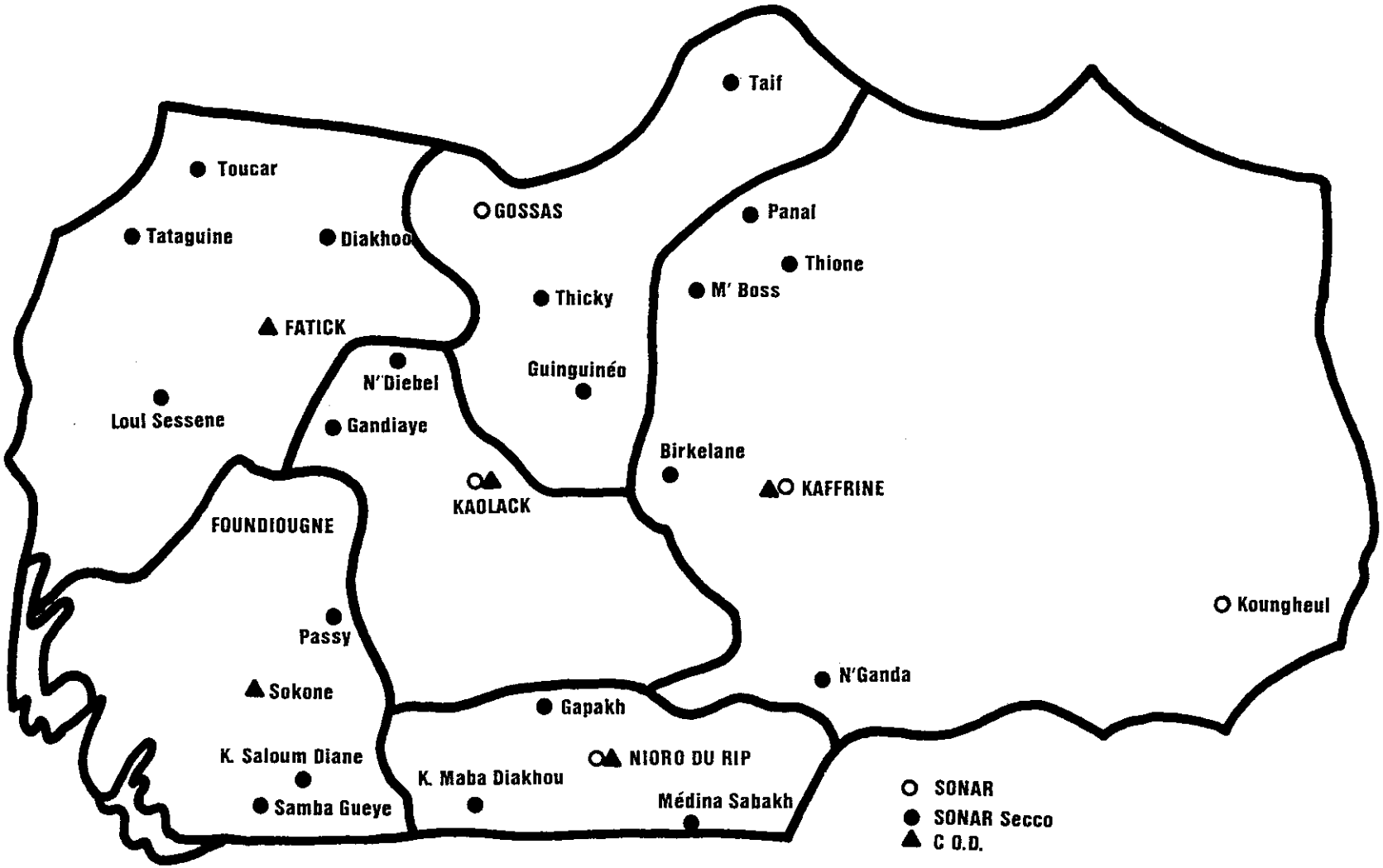

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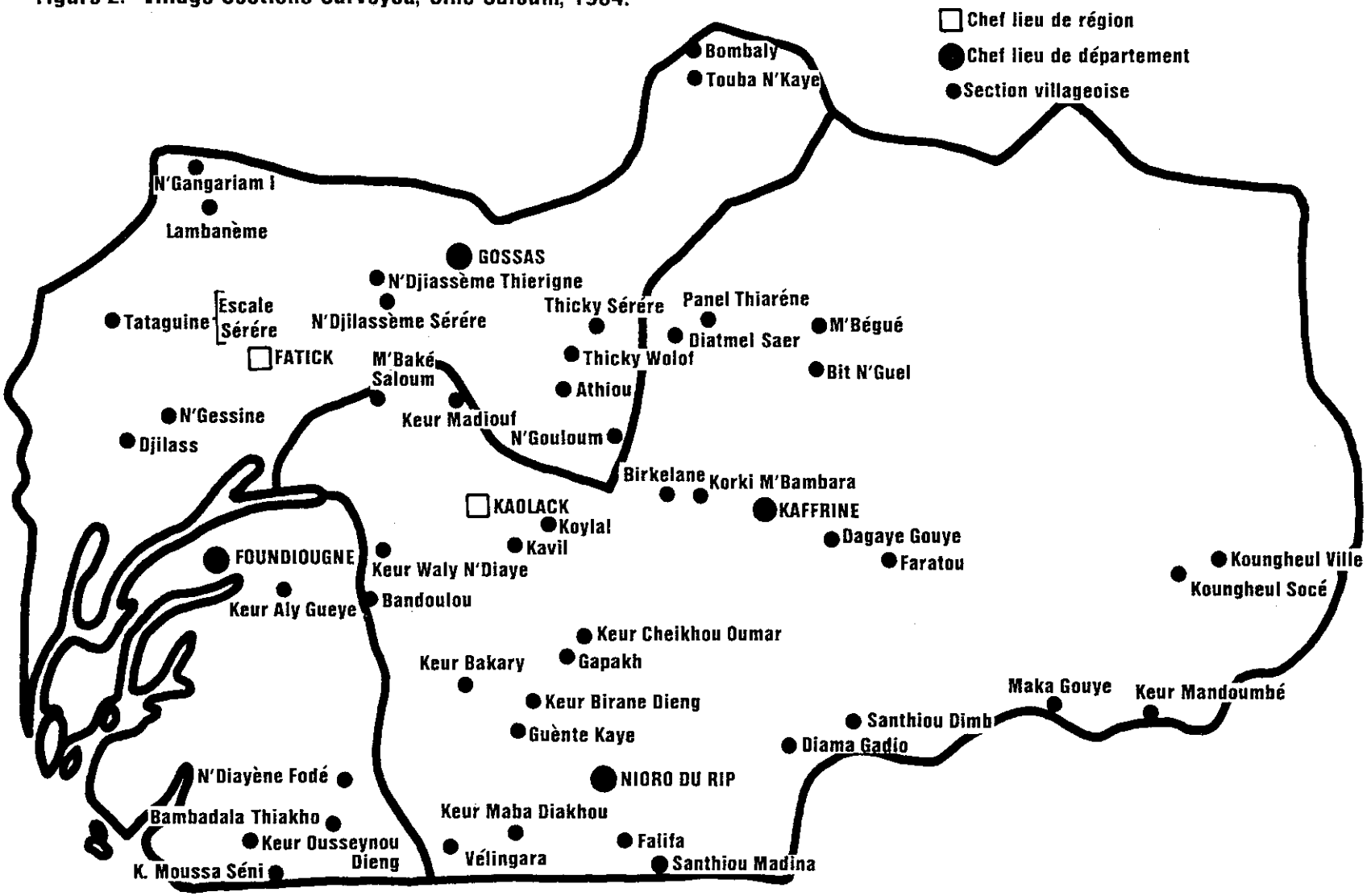
Figure 2. Village Sections Surveyed, Sine-Saloum, 1984.



distribution points represents approximately 68 percent of all fertilizer distributed in the Sine-Saloum.

For the most part, SV's were randomly selected from among those depending on the sampled distribution points. The only exception occured in Koungheul where two randomly selected (and difficult to reach) SV's in the northeast of Koungheul were replaced by sections near the Gambian border. The map in Figure 2 illustrates that the sampled SV's provide a good geographic coverage of the entire Sine-Saloum with the exception of the less densely populated northeast corner which was sacrificed in order to get better information on use of Gambian fertilizers. The 48 SV's in the sample represent 4 percent of all SV's in the regions of Kaolack and Fatick, and about 7 percent of total fertilizer distribution to SV's.

The farmer sample was designed to include a random selection of 144 farmers (3 per SV) from among those ("non-sinistré") who had sold peanuts through official channels during the last campaign, and a purposive sample of 48 farmers (1 per SV) who, due to crop failure ("sinistré"), had not sold peanuts. This attempt to partition respondents into two distinct groups posed a number of problems.[1/]

Problems were also encountered because SV's did not have standardized lists of members having sold peanuts. As a result, 149 farmers (i.e., 144 anticipated and 5 additional for SV's having no "sinistré" farmers) were randomly selected from lists which did not always have the same base--i.e., some lists were peanut sales lists, others were official membership lists, and others were unofficial membership lists put together by the members of the SV during the interviewer's visit. The use of membership lists resulted in selection of two farmers who later had to be eliminated from most of the analyses.[2/]

[1/] Five SV's claimed that all members had sold peanuts last year so the number of "sinistré" dropped to 43 and the number of "non-sinistré" jumped to 149. Seven SV's identified farmers who had not sold any of their own produce but who sold various quantities in their name for others, hence were entitled to fertilizer and often kept it for their own use. Two SV's considered farmers who sold 100 kilos or less as "sinistré". The problem of these cases of "semi-sinistré" is that they resemble three of the randomly selected "non-sinistré" farmers who also sold less than 100 kilos. Due to inadequate time and resources, more appropriate candidates could not be substituted.

[2/] One was an old man who sold last year but did not farm this year and who gave his fertilizer to a nephew; another was a woman who neither sold last year nor farmed this year. Because she was the only female respondent, her answers to the open-ended opinion questions were used.

The full sample of farmers therefore included 192 respondents. For the purposes of most analyses, 190 cases were used. Of these, 156 sold peanuts in their name last year and had rights to "retenue" fertilizer; 147 farmers were considered non-sinistré and 43 were considered sinistré.

4. Fleuve. The four study zones selected in the Fleuve region reflect the existing variability of irrigation schemes with respect to size, management, cropping pattern and accessibility. The perimeter was taken as the basic unit in the study zone, given its importance in the SAED organization. The zones identified were (a) the Delta (Lampsar and Boundoum, large perimeters), (b) Richard-Toll (Ndombo/Thiago and Colonat, medium-size perimeters where SAED is experimenting with decentralization of decision making to farmers), and (c) a set of small irrigated village perimeters in both Podor and Matam departments. These represent four zones, each covered by one interviewer.

Questionnaires were administered at four levels: the perimeter director, the president of the cooperative/section villageoise (SV), the president of the groupement de producteurs (GP), and the individual farmer. At the top level, the variability in distribution procedures is primarily a function of the policies of the individual perimeter director. Cooperatives or village sections do not play a significant role in the distribution process. The GP on the contrary is the key partner in SAED-farmer relations (inputs and services are all provided at this level), and hence was included in the survey. Additional information was collected from SAED zone chiefs and field extension agents.

The sample of SV's, GP's and farmers was as follows:

-- for Lampsar and Boundoum **each**: 2 SV's, 6 GP's (3 per SV), and 19 farmers (3 per GP plus one extra in Boundoum)--thus a total for the two perimeters of 4 SV's, 12 GP's, and 37 farmers.

-- for Ndombo/Thiago and Colonat **each**: 1 SV (there is only one), 4 GP's, and 20 farmers (5 per GP)--thus a total of 2 SV's, 8 GP's, and 40 farmers.

-- for Podor: 5 villages (no SV's are operational) and for three villages, two PIV's (irrigated village perimeters) per village, one GP per PIV, and four farmers per GP. For the two remaining villages with only one PIV, one GP and four farmers. Thus the total sample was 8 GP's and 32 farmers.

-- for Matam: 5 villages (no SV's are operational) and for four villages, two PIV's, one GP per PIV, and four farmers per GP. A fifth village was added, with one GP and four farmers. Thus the total sample was 9 GP's and 36 farmers.

The selection of SV's in the Delta was made in consultation with SAED officials. In Lampsar, one SV was selected randomly and a second SV selected nearby for logistical reasons. In Boundoum, SV's were randomly selected. Villages in Podor and Matam departments were selected, also with SAED officials, so as to cover the variability in cropping patterns and in accessibility (along the main road as well as between the two rivers). An effort was made to select villages with at least two PIV's, but three of the ten villages in the final sample had only one PIV.

Wherever possible, GP's were randomly selected within the SV or village. Farmers were randomly selected from the GP's based on lists of members at the GP level. Since all farmers participating in SAED's irrigated perimeters use fertilizer, no effort was made to survey farmers who did not obtain fertilizer, as was done in the Sine-Saloum and Casamance regions. (Note that some GP's (primarily in Matam) no longer have access to credit, hence they must pay for inputs in cash on delivery.)

C. Questionnaire Design and Testing.

The content of the questionnaires was a function of the objectives of the study, namely to monitor the distribution campaign, assess its performance and the perception of those involved in the system concerning its performance, and determine the level of fertilizer use by farmers. A set of performance criteria was developed, including: (1) timeliness, (2) ability to disseminate fertilizer in the desired quantity and quality, (3) conformance of the distribution procedures to those originally established for the retenue system, and (4) the degree to which the distribution procedures were understood by various participants in the system.

In general, the categories of questions included the following:

1. **Distribution point questionnaire (perimeter, CEPA, secco).**
   - -- Personal characteristics of the manager
   - -- Personnel, equipment, and storage facilities at the distribution point
   - -- Quantity and timing of fertilizer delivered to the distribution point

-- Quantity and timing of fertilizer delivered from the distribution point to the village section (SV), producers group (GP), or farmer
-- Distribution procedures
-- Problems encountered during the distribution
-- Opinions of the manager regarding reform of the system

2. Village section and producers group questionnaire.

-- Background information: membership, resources, etc.
-- Information on groundnut marketing and the retenue (Sine-Saloum and Casamance only)
-- Quantities and timing of inputs received in 1984/85
-- Opinions on the desirable dates for fertilizer distribution
-- Quantities and timing of fertilizer distributed to members
-- Problems encountered in the distribution
-- Financial resources and management of the organization
-- Opinions on possible reform of the distribution system

3. Farmer questionnaire.

-- Characteristics of the farmer and the farm
-- Area planted to different crops this year
-- Farmer's understanding of the retenue system (Sine-Saloum and Casamance only)
-- Questions concerning fertilizer distribution this year
-- Acquisition and use of fertilizer by the farmer this year, by type and source of fertilizer
-- Factors affecting fertilizer use
-- Opinions on possible reform of the distribution system

Copies of these questionnaires are available from the BAME on request.

D. Recruitment and Training of Interviewers.

1. Casamance. Of the 10 applicants, seven interviewers were selected who had previously worked under ISRA research programs. Six of these conducted field interviews, while the seventh served as a link between the BAME researcher in Djibélor and the SONAR regional office. The following requirements were used in choosing the interviewers: high school diploma (BEPC), previous field experience, familiarity with agricultural production systems in one of the study zones, and a command of local languages.

The objectives and methodology of the study, and general interview techniques, were discussed with each interviewer. The interviewers participated in field testing of the questionnaires, assisting with interpretation of questions in the local languages, and with revision of the questionnaires.

2. **Sine-Saloum.** Six interviewers were hired to conduct the farmer and SV interviews. Minimum qualifications demanded of interviewers were:

-- BEPC level of education

-- previous experience as an interviewer in a rural area, and/or excellent knowledge of agricultural practices and institutions in Senegal

A written exam was administered to 13 candidates. Eight were selected on the basis of their exam scores and personal interviews. A one-week training/trial period followed. Although questionnaires used in the study are all written in French, training was conducted primarily in Oulof to assure consistent translation of questions from one interviewer to another. Field trips were taken during the training period; all interviewers had to complete one SV and one farmer interview. These questionnaires were carefully reviewed to assess interviewer skills. A final selection of six interviewers was made after the trial period. Among those selected, 3 had completed coursework for the BAC but had not yet passed the exam, 1 had one year of university studies, and 5 had previously worked for SODEVA, ISRA, and/or SONAR.

Interviewers received two month contracts. While waiting for arrival of the mobylettes, the period of 14-17 August was used to discuss and revise the questionnaires to eliminate problems identified during the field trips, and to review the sampling techniques to be used.

3. **Fleuve.** Candidates were identified from existing files of job applications, and from former OMVS survey interviewers. All candidates were given a written test on mathematical and writing ability, followed by a 30-minute interview in which the candidate's experience, background, agricultural knowledge and attitude were examined. Six interviewers were identified for participation in a subsequent 3-day training session in which the objectives of the survey and the questionnaires were explained (in both French and Oulof). A field trip served both to pre-test the questionnaires

and the candidate's ability to administer them. A final selection of four interviewers was made based on their performance in terms of the above criteria.

E. **Survey Supervision.**

1. **Casamance.** Interviewers were placed in the field after pretesting of the questionnaires. In zones where the survey had not yet been introduced, interviewers were responsible for contacting SONAR and SOMIVAC agents and village chiefs to explain the objectives of the survey. Each interviewer was responsible for obtaining a membership list for the SV's in his zone. Interviewers participated in selection of the sample of SV's and farmers.

Interviewers were visited weekly for the first four weeks of the survey, and then biweekly. Questionnaires were reviewed during each supervision visit to ensure correct interview technique. After the interviewers had finished all questionnaires, a final visit was made to check that all questions had been properly administered.

2. **Sine-Saloum.** After completing 2 SV and 8 farmer interviews, each interviewer met with the survey supervisors for a detailed review of his questionnaires. A review meeting of all interviewers was held in Kaolack after each had completed 4 SV and 16 farmer interviews. These meetings were valuable in assisting interviewers to handle unusual responses not covered by the initial coding system. Supervisory contacts were less frequent during the last half of data collection, as most of the difficult problems had been resolved by that time. Initial supervisory visits identified a need for more training in how to pose open-ended questions and record responses. More field training on this subject prior to the survey would have been helpful.

3. **Fleuve.** Once the interviewers were installed and introduced to SAED and village officials, a list of members for each GP was obtained and the farmer sample was drawn. The first supervisory visit was made after 5-7 days; completed questionnaires were verified and problems discussed. Reinterviewing was undertaken in cases of initial misinterpretation of questions by interviewers. Subsequent weekly visits to all interviewers were made by either the supervisor, his assistant, or both. During each visit, completed questionnaires were verified.

The interviewers administered the farmer, GP, and SV questionnaires, whereas the perimeter directors were interviewed by the supervisor and his

assistant. These interviews took place towards the end of the survey period, so that (a) the most recent and complete information could be obtained on the distribution campaign and on farmer views, and (b) the researchers would be sufficiently familiar with fertilizer distribution in the Fleuve to permit productive discussions with the perimeter directors. This proved to be an effective strategy.

Problems attributed to the SAED HQ level by those interviewed at lower levels were later cross-checked with authorities at the SAED HQ in St. Louis.

F. Data Processing and Analysis.

1. Casamance.

Questionnaires were analyzed partly on the IBM 5120 microcomputer at the ISRA research station at Djibélor, partly on an Apple IIe in Kaolack, and partly on the ISRA/BAME IBM PC microcomputer in Dakar. The IBM BRADS II and STAT2 packages modified at Michigan State University by Paul Winder were used at Djibélor, QuickFile by Apple Computer, Inc. was used on the Apple, and the ABSTAT statistical package by Anderson-Bell was used on the IBM PC.

2. Sine-Saloum.

Questionnaires were analyzed on an Apple IIe microcomputer in Kaolack using QuickFile for data entry and management, SPS by Southeast Technical Associates for data transformations and descriptive statistics, and a non-commercial routine developed by Patrick Kelly for frequency analysis. The research assistant coded and analyzed responses to open-ended questions without the aid of a computer.

3. Fleuve.

Survey data were processed on the BAME IBM PC microcomputer in Dakar, using ABSTAT. The portions of the farmer questionnaire containing information on input use for each perimeter were tabulated and analyzed manually.

In all three regions the use of precoded questionnaires facilitated data entry. Most open-ended opinion questions were partially pre-coded; improvements or additions to initial codes were made prior to data entry. Data listings were checked against the questionnaire sheets and errors corrected.

Statistical analysis was generally limited to frequency distributions of the raw variables. Since information on the area of cultivated parcels was

available, per hectare quantities were also calculated and analyzed. Computer hardware problems slowed the data processing somewhat. However, all farm-level data were entered and analyzed by early October and analysis of farmer organization and distribution point questionnaires was finished by the end of October.

IV. IMPLEMENTATION OF THE STUDY

The planned and actual dates for the major activities of the study are shown below.

Activity	Planned	Actual
Initial planning visits	May-June	May-June
Survey design	June-July	July-early August
Field surveys	July-August	August-September
Data analysis	September	September-October
Preliminary report	15 October	22 October
Final report (summary)	15 November	30 November

The important difference between planned and actual timing is that the field surveys started over one month late, due to delay in approval of funding for the study, and delay in obtaining mobylettes for the field interviewers. In general, activities began a week or two earlier in the Casamance, where interviewers, mobylettes, and operating funds were already available.

V. SURVEY RESULTS--CASAMANCE REGION

A. Background.

Since the dissolution of ONCAD (Office National de Coopération et d'Assistance pour le Développement) in 1980/81, input distribution in the Lower and Middle Casamance has been handled either by the regional development agency SOMIVAC (Société pour la Mise en Valeur Agricole de la Casamance) or its extension organizations PIDAC (Projet Intégré pour le Développement Agricole de la Casamance), covering the Region of Ziguinchor (formerly the Basse Casamance), and PRS (Projet Rural de Sédhiou), covering the Region of Kolda (formerly the Moyenne Casamance); by SONAR; or by private groups such as AJAC (Association de la Jeunesse Agricole de la Casamance). Each organization, while maintaining separate input distribution and credit systems, has participated at some time in regional fertilizer distribution. During the 1983/84 agricultural season, fertilizer was made available in the Basse Casamance through a USAID project within SOMIVAC, at 52 CFA/kg for NPK (8-18-27) and 45 CFA/kg for urea. Fertilizer sales were minimal that year for at least three reasons: a 100 percent price increase in fertilizer from the previous year, late arrival of fertilizer, and low rainfall. A similar situation throughout the country led to the creation of the "retenue à la source" system.

B. Participants, Resources, and Procedures.

In April, 1984, after the groundnut marketing season, SONACOS, SONAR and the development agencies met to determine the type of fertilizer required for each region. For the Casamance, 6-20-10 was chosen. SONAR headquarters decided the quantity to be purchased, based on fertilizer cost, handling, and distribution charges. A total of 4,005.85 tons of 6-20-10 and 1,703.63 tons of urea was allocated to the Casamance. This quota was proportional to the 28 percent contribution of the Casamance to total groundnut sales. Given this quota, it was determined that farmers would receive approximately 40 kg of NPK and 15 kg of urea per ton of peanuts sold.

1. SONAR.

SONAR was the most important fertilizer distribution agency in the Casamance this year. The regional director is based in Ziguinchor, and SONAR representatives are found in each department except Oussouye. There are four sub-regional offices (Centres d'Eclatement de Produits Agricoles, CEPA) located at Ziguinchor, Bignona, Sédhiou, and Kolda. SONAR staff are

distributed throughout the region (Table 1). There are 240 seccos managed by 141 gérants (store managers) who are hired from 1 November to 30 June each year. These part-time gérants are responsible for buying and distributing seeds as well as distributing fertilizer. Other SONAR personnel include 10 quality control officers.

The gérants come from all over Senegal. Eight ethnic groups were represented in our sample of 18 gérants, of which 6 were Oulof and 4 Mandingue. Gérants had an average of 10 years' education, and most had worked previously for SONAR for four years or more.

In terms of physical infrastructure, 70 of the 240 seccos are locally constructed mud brick buildings, 103 are metallic, and 67 are temporary bamboo-fenced open-air structures. Most seccos have roofs and a cement floor. Most of the seccos (217) have a scale. Overall, storage facilities seem adequate for fertilizer storage, according to 61 percent of the gérants. Only 11 percent said the storage facilities were in poor condition; 22 percent said they were too small. However, 67 percent of the gérants said the material for handling and distribution was inadequate, and 58 percent said the personnel was insufficient. Gérants who were unsatisfied with the equipment indicated a need for more twine, bags, and scales.

The distribution system can be described in terms of several stages (Figure 3). Firstly, the quantity of fertilizer depends on the quantity of groundnuts sold to SONACOS (both oil and confectionary types), and the quantity of groundnut seeds sold to SONAR either directly or indirectly through SOMIVAC. Therefore Stage I begins with farmer sales of peanuts to the village section ("section villageoise," SV).

In Stage II, SONAR or SONACOS withhold the "retenue" of 5 CFA/kg of peanuts sold. This is a book transaction rather than a monetary one.

In Stage III, SONAR asks the Regional Development Committee (CRD) for fertilizer recommendations, based on the characteristics of each region. SONAR HQ then places an order with SSEPC (Société Sénégalaise d'Engrais et de Produits Chimiques), which markets imported urea and NPK manufactured by ICS (Industries Chimiques du Sénégal). SONAR HQ determines the amount of fertilizer to distribute to each CEPA.

In Stage IV, ICS manufactures the fertilizer, which is then dispatched by SSEPC to the CEPA's in privately rented 30-ton trucks. Some fertilizer may be placed directly at the seccos (or even at the SV) if they are en route

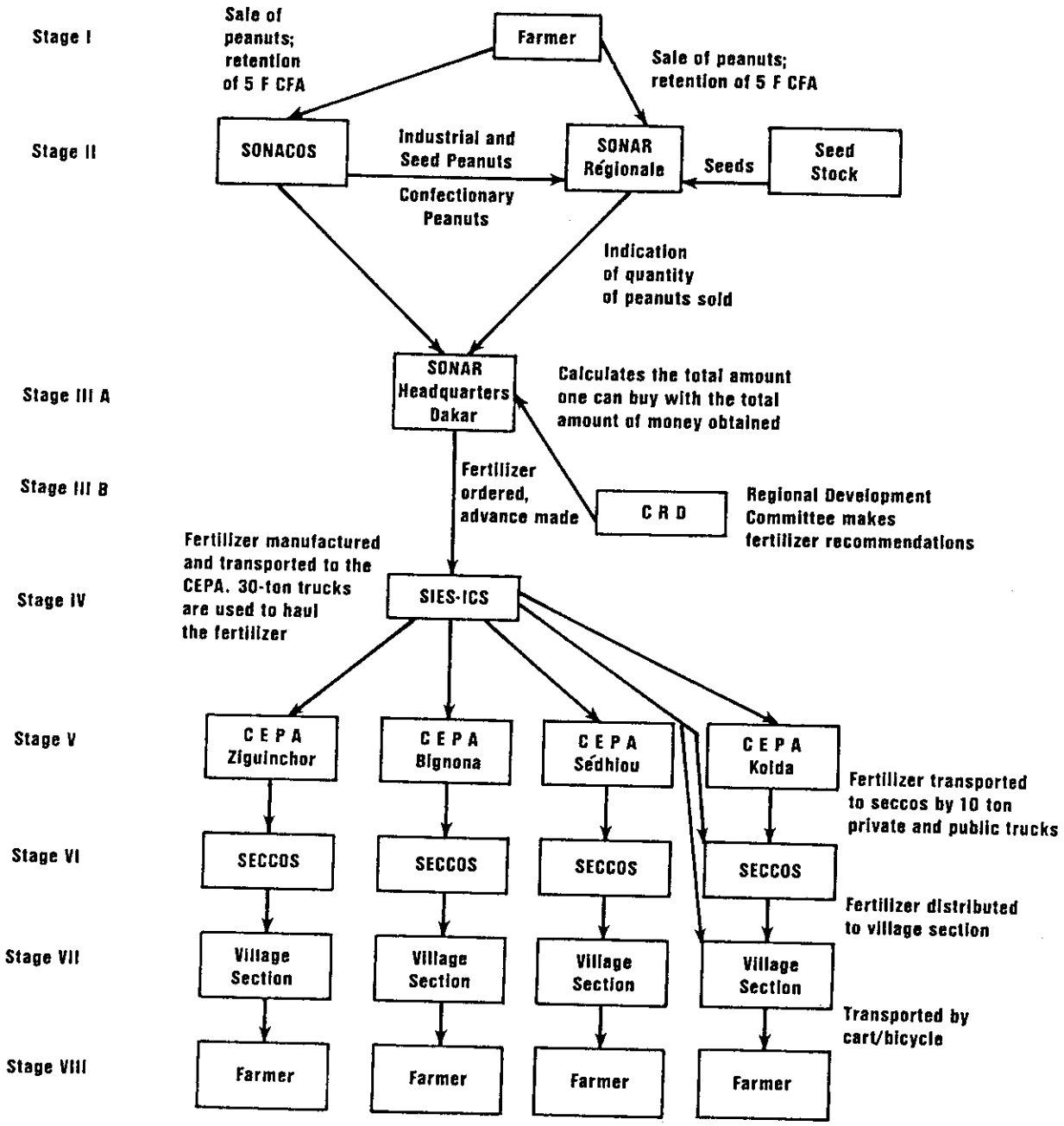
Table 1. Number of Seccos and Seasonal Employees of SONAR, Casamance, 1984.[a/]

Department	No. of Seccos	Selected Managers at Collection Points	Ordinary Managers	Quality Control Officers	Drivers	Assis-tants	Technical Personnel	TOTAL
Ziguinchor	10	--	4	2	--	--	--	6
Oussouye	4	--	2	--	--	--	--	2
Sédhiou I	70	12	30	2	1	--	10	55
Sédhiou II	34	4	12	--	--	--	--	16
Kolda	70	26	15	2	1	--	7	51
Velingara	24	7	9	2	1	1	4	24
Bignona	28	10	10	2	1	--	2	25
TOTAL	240	59	82	10	4	1	23	179

Source: SONAR, Ziguinchor, September, 1984.

[a/]Secco = local SONAR distribution point.

Figure 3. Fertilizer Distribution System of SONAR, Ziguinchor, 1984/1985.



to the CEPA's. Velingara was supplied directly through Tambacounda in order to reduce transport problems.

In Stage V, the fertilizer is received at the CEPA's, and transferred onwards to the seccos. Four trucks owned by SONAR plus several rented 10-ton trucks were used to distribute fertilizer to the 241 seccos this year. The gérant accompanies the truck from the CEPA to the secco.

In Stage VI, a commission is set up by the SV to deal with fertilizer distribution. The commission is composed of the president of the SV, the SONACOS weigher, and three officers. Dates are set for the transfer from the secco to the SV. In 1984, this exercise took about three weeks. The SONAR Departmental Coordinator (CO.D) prepared a list of members of each SV entitled to receive fertilizer from the seccos. This list was given to the gérant.

In Stage VII, the gérant distributes the fertilizer to the SV's commission. The gérant is responsible for informing the president of the SV of the time of fertilizer arrival. In the survey, 67 percent of the presidents said they had been informed by the gérants; another 16 percent were informed by the SOMIVAC extension agent. The average time of distribution from secco to SV was 16 days, but 65 percent of the seccos did the distribution in less than 5 days.

In Stage VIII, the SV receives the fertilizer and distributes it to farmers. For 35 percent of the SV's surveyed this year, the president went directly to the secco to receive the fertilizer; 24 percent of the time, the contact was made by the village chief. Farmers were responsible for transporting the fertilizer to their farms. The quantities received per farmer in the regions of Ziguinchor and Kolda were generally so small (70 kg of NPK and 28 kg of urea) that most farmers used bicycles rather than renting carts or other vehicles to transport fertilizer.

2. Village sections.

Village sections were established under Law No. 83-07 (January, 1983) and Decree No. 83-320 (25 March, 1983). The major responsibility of the SV is to serve the agricultural needs of its members. There are 165 village sections (SV's) in the region of Ziguinchor and 504 in the region of Kolda. Each SV is tied to a mother cooperative ("coopérative mère") and should consist of at least 200 members.

Since the SV's are newly formed, not all have a list of members. Some are still soliciting members. In many cases, the SV is not a well-structured group with a written constitution.

Few of the SV's have experience conducting business as a group. For example, 86 percent of those studied had no bank account and 98 percent had never borrowed money from a bank. In terms of infrastructure, only 3.9 percent owned a cart, 47.1 percent had scales, and 5.9 percent owned storage facilities. In terms of human resources, the level of literacy is not high; only 40 percent of SV presidents were able to read, and only 75 percent could either read or write. These characteristics do not necessarily mean an inherent lack of management capacity on the part of SV's, but they do represent a handicap in the short run.

3. SOMIVAC.

SOMIVAC, through its extension arm PIDAC, has its own fertilizer distribution program, which differs significantly from the SONAR program. PIDAC operates only in the Basse Casamance, now called the Ziguinchor Region. The PIDAC fertilizer program, called the "Crédit Spécial," is funded by USAID (see Figure 4). USAID purchases the fertilizer and makes it available to PIDAC for distribution to the producers groups (GP's) in PIDAC's extension areas.

During the 1983/1984 season, PIDAC distributed only 5.25 tons of NPK (8-18-27) and 14.3 tons of urea. The fertilizer arrived in July, too late to be useful to farmers. This year the fertilizer arrived early, and to date 194.81 tons of NPK and 169.008 tons of urea have been distributed.

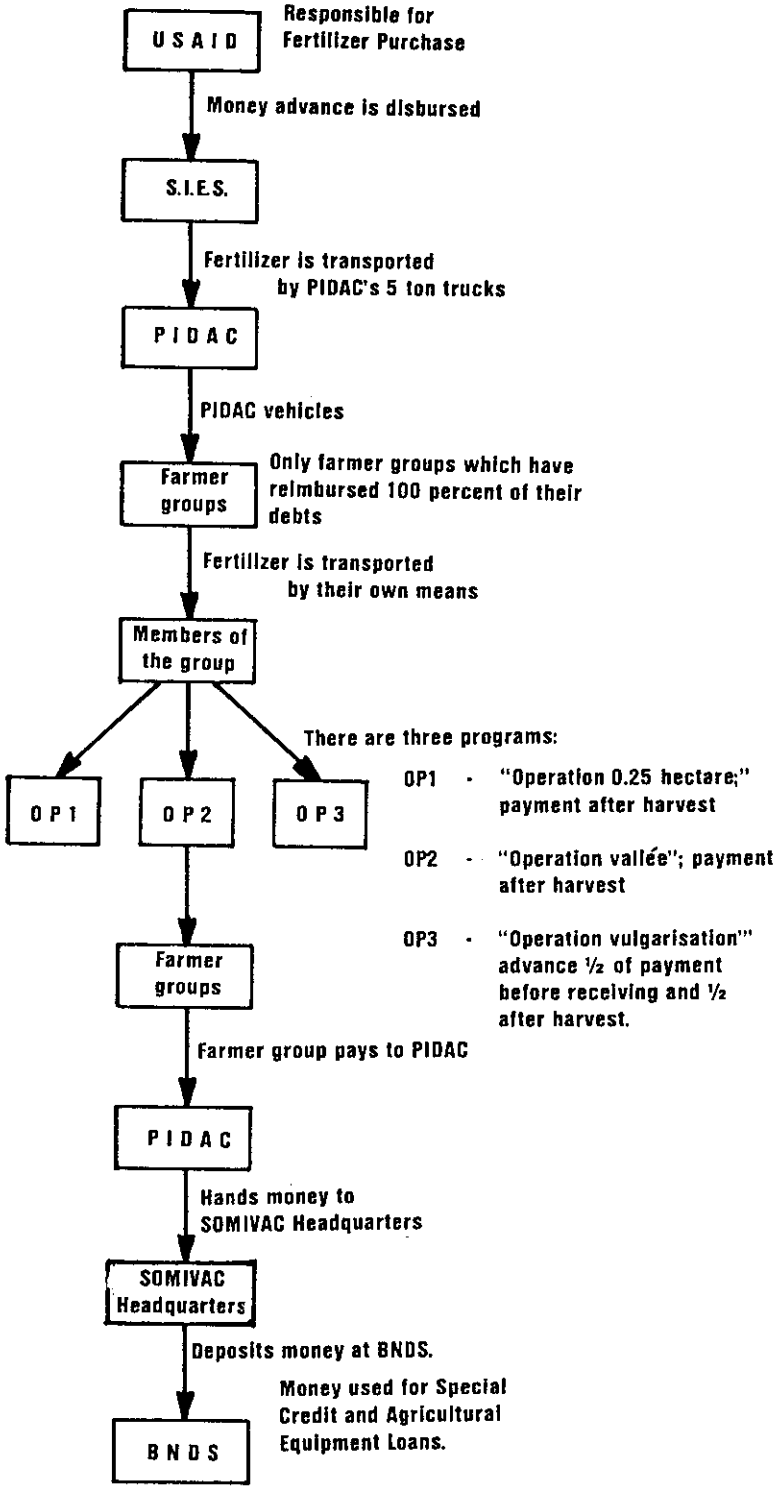
The PIDAC program involves three options:

(1) Operation 1, in which farmers are encouraged to grow 0.25 ha of rice using 200 kg/ha of NPK. Farmers following PIDAC recommendations thus receive 50 kg of NPK. The cost is reimbursed to the GP after harvest.

(2) Operation 2, or "Opération Vallé," in which each farmer receives NPK at 52 CFA/kg and urea at 45 CFA/kg. Farmers must apply PIDAC's recommended 200 kg/ha for rice and maize, and 150 kg/ha for millet. Reimbursement is also made after harvest.

(3) Operation 3, or "Opération Multiplication et Vulgarisation," provides fertilizer to farmers on a 50 percent credit, to be repaid at harvest.

Figure 4. Fertilizer Distribution System of PIDAC Under Special Credit System, 1984/1985.



The GP is the key unit for PIDAC. The GP is responsible for ensuring debt repayment, and can receive further credit only if 100 percent of previous debts have been repaid. To serve as collateral, the GP's have a total bank account of 7 million CFA, established during the ILACO project (1965). According to PIDAC, farmers have recently shown renewed interest in this fund; in 1984, contributions from all GP's rose to 1.5 million CFA. PIDAC officers attribute this increase to the GPs' interest in the new fertilizer credit program. They note that 89.9 percent of last year's debt for agricultural equipment and 94 percent for fertilizer was reimbursed.

Under the fertilizer program ("Crédit Spécial"), farmer payments to the GP at harvest are transmitted by the GP to the Director of SOMIVAC, who places the funds in an account at the BNDS (Banque Nationale pour le Développement du Sénégal). These funds are used the following year by USAID to purchase additional fertilizer and other inputs.

4. AJAC.

The Agricultural Youth Association of the Casamance (AJAC, Association de la Jeunesse Agricole de la Casamance) distributes some fertilizer in the regions of Ziguinchor and Kolda. The fertilizer is mainly for dry-season vegetable production, but farmers store some for use on rainy-season cereals.

AJAC attempts to convince youth group leaders of the value of fertilizer. AJAC relies on buying subsidized fertilizer (52 CFA/kg last year and 25 CFA/kg the year before). They are not certain that farmers will buy fertilizer at the new, higher prices.

C. The Distribution Campaign.

1. Overview.

Of the 5,709.5 tons of fertilizer allotted by SONAR to the Casamance, 5,689.9 tons (99.7 percent) were actually received, while 5,641.8 tons (99.2 percent) were placed at seccos, and 5,573.7 tons (97.6 percent) were distributed to SV's (Table 2). The region of Kolda received 81.2 percent of the fertilizer.

According to SONAR records, reception of fertilizer at the CEPA's began the second week of June, with distribution to seccos beginning immediately after. Some gérants surveyed indicated that fertilizer distribution to seccos had started the last week of May. SONAR records show that by the first week of September, all NPK (6-20-10) received at Ziguinchor had been distributed to seccos, and 97.27 percent had been distributed to SV's

Table 2. Summary of the Fertilizer Distribution Campaign, Casamance, 1984.

Department	Attributed Tons	Received Tons[a]	Placed Tons[b]	% Placed[c]	Distributed Tons[d]	% Distributed[c]
Oussouye	17.20	17.20	17.20	100.00	17.20	100.00
Ziguinchor	201.65	201.65	201.65	100.00	201.65	100.00
Bignona	853.10	853.10	853.10	100.00	784.95	92.01
Sédhiou I	1,619.55	1,600.60	1,600.10	99.96	1,600.10	98.79
Sédhiou II	887.50	887.50	871.67	98.21	871.67	98.21
Kolda	1,609.00	1,608.37	1,576.60	98.02	1,576.60	97.98
Velingara	521.50	521.50	521.50	100.00	521.50	100.00
TOTAL	5,709.50	5,689.92	5,641.82	99.15	5,573.67	97.62

Source: SONAR, Ziguinchor, 1984.

[a]/Received = CEPA level.

[b]/Placed = secco level.

[c]/Percentages are with respect to the amount attributed.

[d]/Distributed = village section level.

(Table 3). In the region of Kolda, 99.41 percent of the NPK had been received, and 99.29 percent placed at seccos and distributed to SV's. **(Note:** In SONAR's terminology, "reception" refers to the CEPA level, "placement" to the secco level, and "distribution" to the SV level.)

For urea, the distribution process occurred later and was therefore less successful. By the first week of September, all of the urea for Ziguinchor had been received and sent to seccos, but only 85 percent had been distributed to SV's (Table 4). In Kolda, by that time 99.87 percent had been received, 87.55 percent had been placed at seccos and 84.22 percent distributed to SV's.

The best picture of the distribution process is obtained by looking at the weekly figures for each region.

2. Region of Ziguinchor.

NPK began to arrive at the CEPA's during the week of 11-17 June; 749.8 tons were received for the region of Ziguinchor, or 99.89 percent of the amount due (Annex Table 1). During the same week, 96.08 percent of the 749.8 tons was placed at the secco level (Annex Table 2). However, distribution to the SV's did not begin until the third week in the departments of Ziguinchor and Bignona. For the department of Oussouye, distribution did not begin until the fourth week (2-8 July). By the second week all the fertilizer for Ziguinchor was in place at the seccos.

Distribution to SV's accelerated from zero to 37 percent during the third week, and to 83 percent in the fourth week. Distribution was more prolonged in the department of Bignona. By the third week, only 58 percent of the total allotment was distributed.

Urea arrived much later, being sent first to the Bignona CEPA around the fourth week of distribution (2-8 July). Ninety-two percent was received during this week. The departments of Oussouye and Ziguinchor did not receive urea until the fourth and sixth weeks. However, when the urea finally arrived, it was placed at seccos and immediately distributed. In Bignona, the distribution began slowly; it was not until the 10th week that urea placed at the secco was distributed.

3. Region of Kolda.

Kolda was less fortunate than Ziguinchor, in that fertilizer arrived late. By the first week, only 52 percent of the allotment was placed at seccos (Table 3). Distribution began in the third week, but it took until the 12th week for 99 percent to be distributed.

Table 3. Percentage Reception, Placement, and Distribution of Fertilizer (6-20-10) for Ziguinchor and Kolda Regions, 1984.[a/]

	June		July						August		
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
					(WEEKS)						
Region	1	2	3	4	5	6	7	8	9	10	11
Ziguinchor											
Received	99.89	100.0									
Placed	99.08	100.0									
Distributed	--	--	36.97	83.0	87.0	90.05	93.88	95.52	97.27	97.27	97.27
Kolda											
Received	52.17	63.88	71.79	71.79	71.79	91.84	99.41	99.41	99.41	99.41	99.41
Placed	52.17	54.45	66.0	66.0	69.0	72.72	76.86	82.23	87.25	95.84	99.29
Distributed	--	--	11.54	29.0	43.0	63.60	73.03	78.37	87.25	95.84	99.29

Source: SONAR, Ziguinchor, 1984.

[a/]Reception = CEPA level

Placement = secco level

Distribution = village section level

Table 4. Percentage Reception, Placement, and Distribution of Urea for Ziguinchor and Kolda Regions, 1984.[a]

	June			July				August			
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
Region	1	2	3	4	(W E E K S) 5	6	7	8	9	10	11
Ziguinchor											
Received	--	--	--	73.0	92.0	99.78	99.78	99.78	100.0		
Placed	--	--	--	19.0	36.0	49.82	67.34	77.94	96.50	100.0	
Distributed	--	--	--	--	12.2	41.18	45.40	60.43	71.80	85.11	85.11
Kolda											
Received	--	--	--	33.0	82.0	98.48	99.54	99.87	99.87	99.87	99.87
Placed	--	--	--	12.0	15.0	20.15	35.45	41.41	50.09	68.27	87.55
Distributed	--	--	--	--	3.2	10.12	28.06	34.92	48.03	64.94	84.22

Source: SONAR, Ziguinchor, 1984.

[a] Reception = CEPA level

Placement = secco level

Distribution = village section level

The distribution centers at Sédhiou I and II experienced serious problems. As shown in Annex Table 2, by the fourth week only 79 percent of the NPK had been received at the Sédhiou I CEPA, with 69 percent placed at seccos, and 52 percent distributed. Distribution was even slower at Sédhiou II: during the same period, only 47 percent was placed at seccos and 42 percent distributed to SV's.

For urea, whose distribution began late throughout the department of Sédhiou, deliveries accelerated rapidly and after two weeks 84 percent had been received (Annex Table 3). Placement at seccos and distribution was very slow, however; only 19 percent was placed by the 5th week, and 3 percent distributed to SV's. For the region as a whole, although 99.96 percent had been received by the 9th week, only 59 and 53 percent had been placed and distributed, respectively.

Not much delay occurred in distribution at the SV level. Most distribution was done at the secco, although in some cases fertilizer was delivered directly to the SV. On average, each farmer spent 7 hours in obtaining fertilizer.

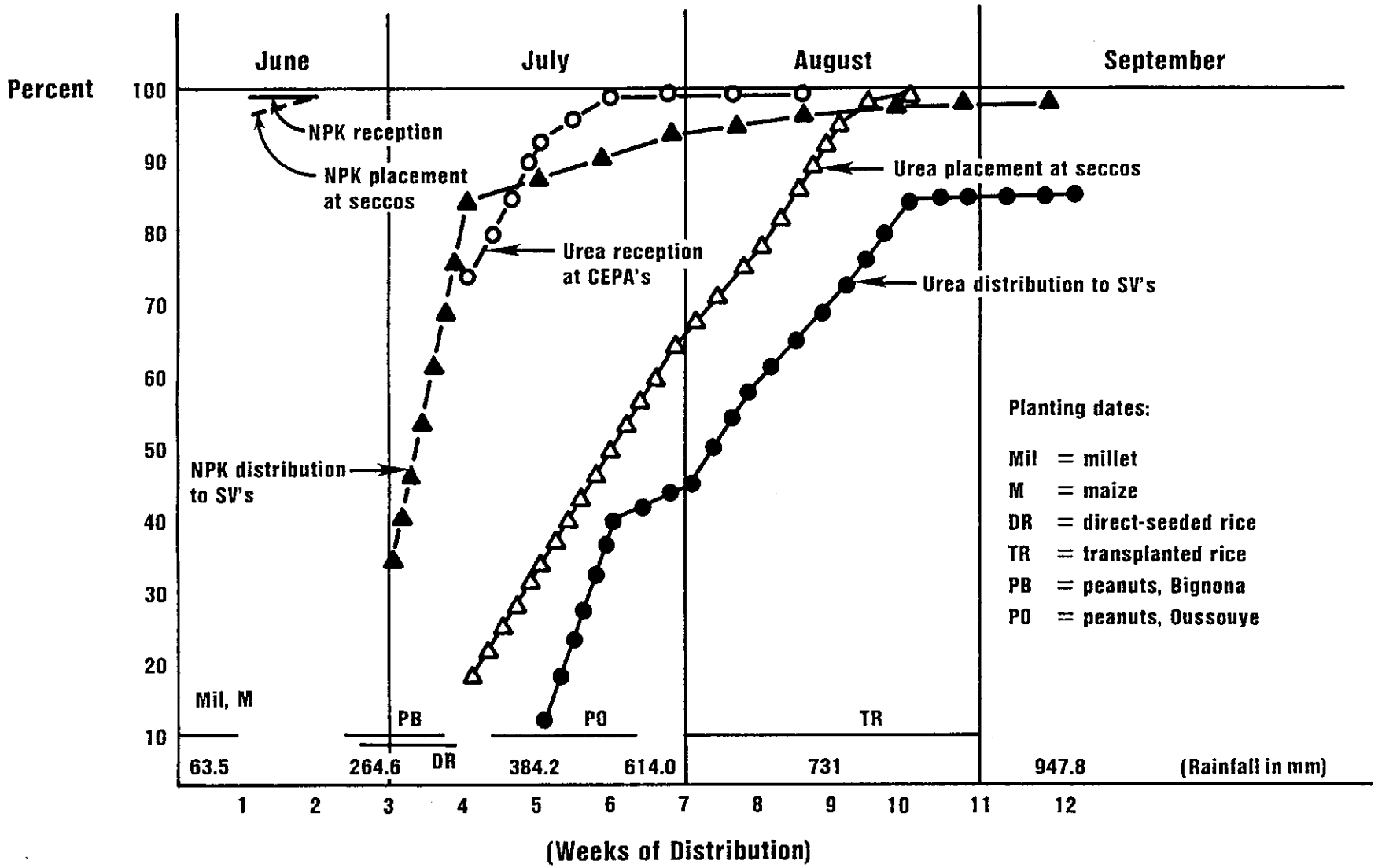
4. Overall distribution performance.

Annex Tables 2 and 3 and Figures 5 and 6 show distribution activities over a 12-week period; Figures 5 and 6 also show rainfall and planting times for the key crops. Even at the end of 12 weeks, 20.494 tons remained to be distributed in Ziguinchor. (Note: it was implied by SONAR officials that the people of Bignona had refused 18.95 tons.) Distribution went quicker in Oussouye than in Bignona, which has 70 percent of the seccos in the region of Ziguinchor.

By 15 October, 99 percent of the NPK and 97 percent of the urea had been distributed in the region of Kolda. There remained 23 tons of NPK and 46.68 tons of urea to be distributed. Distribution was slowest in the department of Sédhiou, which has 47 percent of the seccos in the region of Kolda.

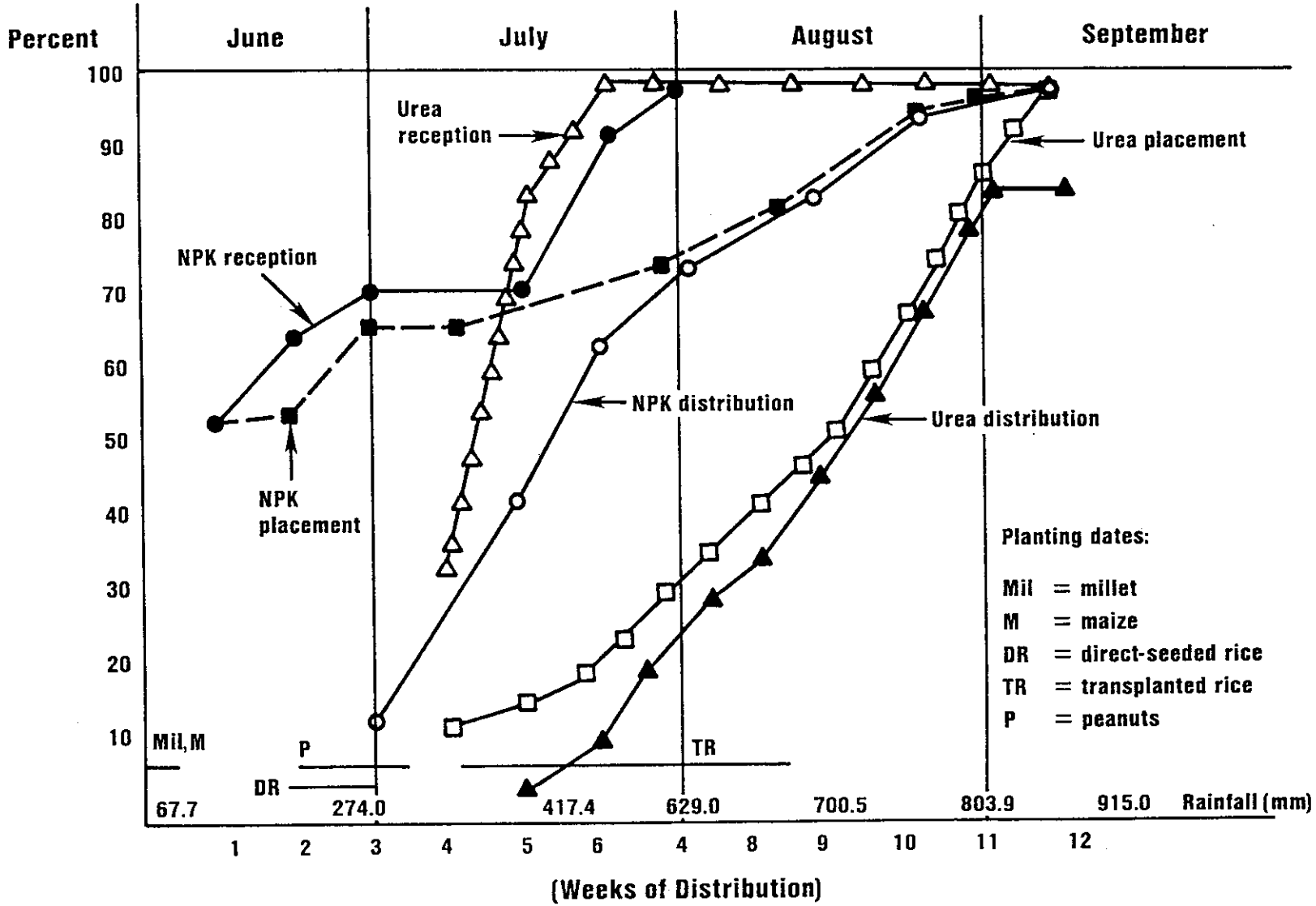
For the two regions together, 98.9 percent of the NPK and 92.3 percent of the urea were distributed to farmers. This seems impressive, except for the delays experienced in distribution at the secco and SV levels. Figures 5 and 6 show a big gap in the Ziguinchor region between placement and distribution; distribution slowed to almost zero after the 6th week. In explaining this delay, SONAR officials stated that it took time for the SV's to appoint their commissions and to set the dates for distribution of

Figure 5. Reception, Placement, and Distribution of Fertilizer; Rainfall; and Time of Planting—Region of Ziguinchor, 1984. a/



a/ Rainfall figures are for the ISRA Station at Djibélor. Planting times are taken from the Production Systems Research Team Report, 1982/83.

Figure 6. Reception, Placement, and Distribution of Fertilizer; Rainfall; and Time of Planting—Region of Kolda, 1984. a/



a/ Rainfall figures and planting dates are for Sefa zone.
Fertilizer figures from SONAR, Ziguinchor.

fertilizer to farmers. In addition, roads were in poor condition at that time because of early rains. (The region received 63.5 mm of rain by the second week of June, 264.6 mm by the end of June, and another 143.4 mm by the middle of July.) Also, by the end of June, truckers who had participated in transportation of seeds had not been paid, and were thus reluctant to do additional work for SONAR.

How serious were these delays? According to an ISRA agronomist at Djibélor, farmers probably benefitted only partially from fertilizer use. Based on information gathered from a sample of farmer fields in the 1984 rainy season, Figure 7 shows the cumulative percent by week of fields planted in maize, peanuts, and lowland rice, together with the cumulative percent of NPK and urea distributed.[1/] It can be seen that by the time NPK distribution began, 38 percent of lowland rice fields, 50 percent of peanut fields, and 70 percent of maize fields were already planted. Defining the "coefficient of NPK effectiveness" as the percent of NPK distributed at a given time multiplied by the percent of fields not yet planted, this coefficient is 0.17 for maize (58 percent NPK distributed times 30 percent of fields not planted), 0.26 for peanuts, and 0.36 for lowland rice, as of the first week of July. In other words, the estimated effectiveness of NPK was only 17 to 36 percent. (This assumes that all NPK distributed is used, and that all crops planted receive NPK at planting time.)

Late distribution was less damaging for urea, since urea is not usually applied on peanuts, and is side-dressed on cereals after several weeks of crop growth. Nonetheless, given that distribution of urea lagged 5 weeks behind planting of maize, and 3-4 weeks behind planting of lowland rice, some loss of urea effectiveness probably occurred as well.

Due in part to early rains and inaccessible roads, fertilizer also arrived in the Kolda region after many farmers had already started planting. Maize and millet had long since been planted, and direct-seeded rice was also in the ground. Peanuts and transplanted rice could have benefitted from the fertilizer, despite the delays. However, by the time 70 percent of the

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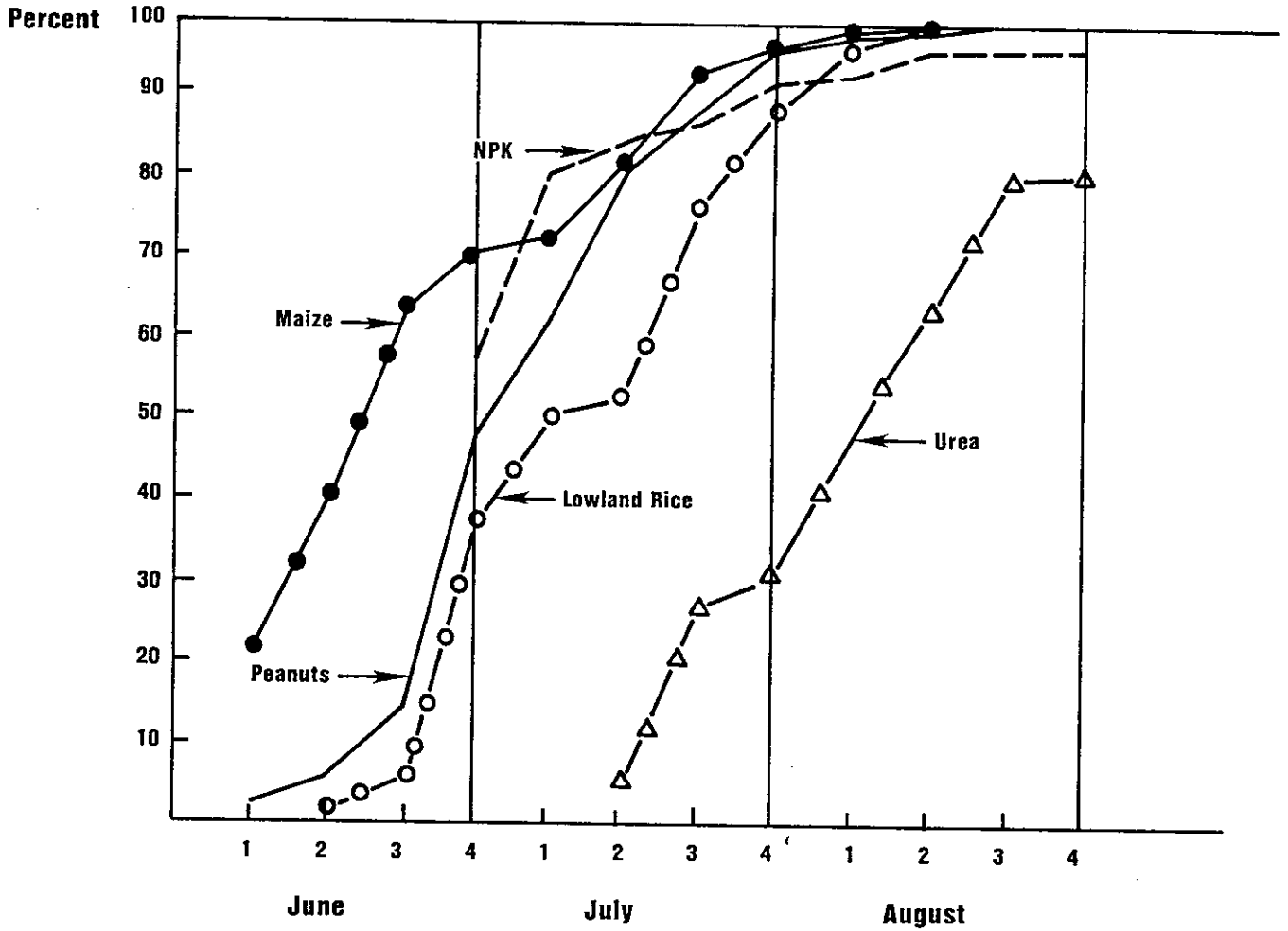
[1/] Data were obtained by the ISRA Production Systems Research Team for 68 maize fields, 79 peanut fields, and 240 lowland rice fields in five villages of the Department of Bignona (Boulandor, Medieg, Tendiman, Bandjikaki, and Suel). Bignona received 79.6 percent of all SONAR fertilizers distributed in the region of Ziguinchor, hence provides a good basis for evaluating the effectiveness of fertilizer use in that region.

Figure 7. Cumulative Frequency of Fields Planted in Bignona Department, and Percent of Fertilizer Distributed, Casamance, 1984. a/



a/ Source for fertilizer distribution, field surveys, 1984. Source for fields planted, field surveys by ISRA Production Systems Research Team, Djibélor, 1984—villages of Boulandor, Medieg, Tendimane, Bandjikaki and Suel.

fertilizer had been received, some farmers were already harvesting maize and early peanuts. For some crops, the urea was too late to be useful.

D. Fertilizer Use by Farmers.

Results from the six zones studied show that farmers received 31.8 tons of fertilizer from all sources, of which 90.9 percent came from SONAR under the retenue program, 8.6 percent from PIDAC and other development agencies, 0.35 percent from outside Senegal, and the rest from gifts. All fertilizer received by sample farmers in the three zones studied in Kolda came from the retenue program.

Of the 31.8 tons of fertilizer received by our sample of 239 farmers, only 28.3 tons (89 percent) were actually used (Table 5). The quantity of fertilizer applied per hectare planted of all crops combined was very small, averaging 25.4 kg/ha and ranging from 12.8 kg/ha in Kaguite to 41.1 kg/ha in Simbandi Brassou. By crop the range was from 11.7 kg/ha for sorghum to 44.0 kg/ha for rice (Table 6). This compares to SOMIVAC's recommended doses of 200 kg/ha for rice and maize, and 150 kg/ha for millet.

Although rice is not considered a cash crop in this area, it received 11.2 tons or 39.5 percent of all fertilizer used (Table 6); 29.1 percent was used on peanuts, 12.8 percent on millet, 11.6 percent on maize, 6.7 percent on sorghum, and 0.2 percent on cotton. Most of the SONAR fertilizer was used on rice. It is difficult to tell whether this much fertilizer was used on rice because it was optimal, or because rice was the only crop which could still benefit from fertilizer despite its late arrival.

The cereals together received 70.6 percent of all fertilizer used. **Therefore, although it was the sale of peanuts that financed the fertilizer retenue, cereals benefitted more than peanuts from fertilizer applications.**

Kolda received 77 percent of fertilizer received from all sources, of which 37.2 percent was applied on rice (71.4 percent on all cereals combined), and 28.6 percent on peanuts (calculated from Annex Tables 4-6). In the region of Ziguinchor, 63.4 percent of the fertilizer used came from the retenue, of which 49.1 percent was used on rice (72.2 percent on all cereals combined), and 27.8 percent on peanuts. Twenty-six percent of the fertilizer in Ziguinchor came from the PIDAC program, of which 66.2 percent was used on rice and only 14.7 percent on peanuts (calculated from Annex Tables 7-9).

Table 5. Fertilizer Use by Type and Zone, Casamance, 1984/85 Season.

Zone	Area (Ha.)	(Amounts in Kilograms) 8-18-27	6-20-10	NPK[a]	Urea	Total	Total Kg/ha
Ziguinchor	**269.83**	**1,411**	**1,195**	**1,372**	**2,466**	**6,444**	**23.9**
Oussouye	74.12	45	50	739	341	1,175	15.9
Kaguite	39.68	300	206	--	--	506	12.8
Karongue	156.03	1,066	939	633	2,125	4,763	15.9
Kolda	**843.85**	--	**5,976**	**9,758**	**6,106**	**21,840**	**25.9**
Maniora	409.80	--	5,921	--	2,243	8,164	19.9
Sédhiou	209.50	--	--	3,735	724	4,459	21.3
Simbandi Brassou	224.55	--	55	6,023	3,139	9,217	41.1
TOTAL	1,113.68	1,411	7,171	11,130	8,572	28,284	25.4

Table 6. Fertilizer Use by Type and Crop, Casamance, 1984/85 Season.

Crop	Area (Ha.)	(Amounts in Kilograms) 8-18-27	6-20-10	NPK[a]	Urea	Total	Total Kg/ha
Peanuts	400.45	304	4,433	869	2,634	8,240	20.6
Millet	191.01	---	1,054	2,511	80	3,645	19.1
Rice	254.23	782	553	7,086	2,762	11,183	44.0
Sorghum	162.23	---	291	241	1,364	1,896	11.7
Maize	101.51	325	840	423	1,680	3,268	32.2
Cotton	4.25	---	---	---	52	52	12.2
TOTAL	1,113.68	1,411	7,171	11,130	8,572	28,284	25.4

Source: Field surveys, August-September, 1984. A total of 239 farmers were sampled in the regions of Ziguinchor and Kolda (Department of Sédhiou).

[a]/NPK refers to compound fertilizer whose exact formula was not identified.

Only a minimal quantity of fertilizer came from sources other than SONAR and PIDAC. Very little fertilizer was left over from last year. Only two individuals bought fertilizer from the Gambia, for use mainly on peanuts. A total of 3.5 tons of fertilizer (11.1 percent of the total received) was stored for later use.

E. **Problems and Constraints.**

Problems occurred with both placement and distribution of fertilizer, especially in the region of Kolda. Problems encountered were related mainly to logistics. Fertilizer did arrive late at the CEPA's in the Ziguinchor region; however, the problem was not in placing fertilizer at the seccos but in distributing it to SV's. The delay in distribution from seccos to SV's is difficult to explain. Figure 5 shows that in Ziguinchor all NPK was placed at the seccos by the second week of June. Distribution could have been accomplished in two weeks. However, by the time the SV's organized their commissions and set the distribution dates, the contracts of the gérants had expired and new work agreements had to be arranged.

The greatest problem occurred with urea distribution. The reasons given by SONAR for the slow rate of placement at seccos were (a) the poor road conditions, and (b) the unwillingness of private truckers to work for SONAR so long as their previous bills remained unpaid. Whereas SONAR has the authority to rent vehicles locally, the regional office does not have the autonomy to pay the chauffeurs. Bills must be sent to Dakar for payment, which contributes to the delays.

The regional director of SONAR agreed that the distribution was late, but explained that this was mainly due to interruption of supplies by ICS. He also stated that if the fertilizer had arrived by the end of May as expected, it would have been all distributed by mid-July. As it was, by the time fertilizer actually arrived, roads were already virtually impassable due to the early rains. Another constraint cited by the director was the widely dispersed nature of the seccos--198 out of the 240 seccos are in Kolda, where distribution took longer.

Another problem was the number of trips needed per secco. The average amount delivered per secco was 14.24 tons of NPK in Ziguinchor and 16.43 tons in Kolda. Using 10-ton trucks necessitated two trips per secco on average. Given that on average seccos received 7.2 tons of urea in Ziguinchor and 7.0 tons in Kolda, transport and handling costs could have been reduced if both NPK and urea had been ready for delivery at the same time.

Distribution problems at the SV level primarily involved problems of determining who sold peanuts and was thus entitled to fertilizer. In some cases amounts distributed were based on the number of people who showed up for fertilizer. Some farmers who were not members of the SV but who sold peanuts had difficulty receiving fertilizer. The SV's have been recently formed or are still being formed, and some were still preparing their membership lists. Also, some SV's encompass 2-3 villages, and therefore experience ethnic rivalries.

In principle, all SV's were also supposed to have a list of farmers who sold peanuts through the SV. In practice, 67 percent of the sample of SV's had a list which they had prepared at the time of marketing, 16 percent had a list prepared by SONAR or SONACOS, and only 4 percent had no list.

The amount of fertilizer received by farmers varied considerably in relation to the amount of peanuts they had sold through official channels (SONAR and SONACOS) in 1983/84. For the Casamance sample as a whole, farmers received an average of 36.9 kg of NPK and 14.8 kg of urea per ton of peanuts sold (Table 7). The figures were lower in Ziguinchor Region (29.5 kg NPK and 13.3 kg urea) than in Kolda Region (38.6 kg NPK and 15.3 kg urea). There was variation even within the regions (see Table 7); some areas received substantially less than the total 55 kg/ton planned. Of the 228 farmers sampled, 63 percent received less than 55 kg/ton; interestingly, 11 percent received over 95 kg/ton. (See Annex Table 10 for the complete frequency distribution.)

Other procedural problems occurred. In some cases, farmers who sold less than one ton of peanuts did not receive fertilizer. In cases where the amount due was less than 50 kg, 65 percent of the time the bag was opened and the correct amount weighed out; 20 percent of the time a bag was given to several farmers to share among themselves; and 6 percent of the time the correct amount was estimated without weighing.

Lack of information was an additional problem. Farmers, and even presidents of the SV's, were not well informed of how the retenue worked; 13.7 percent of SV's and 33 percent of farmers stated that they did not understand how their allotment of fertilizer had been calculated. Fifty-two percent of SV's and 29 percent of farmers knew that the rate was 40 kg of NPK per ton of peanuts sold, and 33.3 percent of SV's knew only that the price of fertilizer was equivalent to 125 CFA/kg. Most farmers had expected to receive more fertilizer.

Table 7. Fertilizer Received per Ton of Peanuts Sold by Farmers, by Region and Zone, Casamance, 1984.

Region/Zone	NPK (kg/ton)	Urea (kg/ton)	Total (kg/ton)
Ziguinchor	**29.5**	**13.3**	**42.8**
Kaguite	23.8	36.5	60.3
Oussouye	20.3	10.2	30.5
Karongue	34.1	10.0	44.1
Kolda	**38.6**	**15.3**	**53.9**
Simbandi-Brassou	37.9	11.1	49.0
Maniora	40.6	16.6	57.2
Sédhiou	35.4	16.5	51.9
Casamance	**36.9**	**14.8**	**51.7**

Source: Field surveys, 1984.

Note: In principle, farmers were to receive 40 kg of NPK and 15 kg of urea per ton of peanuts sold in 1983/84.

F. Attitudes and Opinions.

Because of problems experienced in explaining how the fertilizer allotments were calculated, 3 of the 18 gérants interviewed wanted to change the whole system. Thirty-nine percent of the gérants indicated that if SONAR were no longer to handle fertilizer distribution, they would prefer it to be handled by SSEPC plus the SV's. Twenty-eight percent preferred the cooperatives, and 22 percent thought that SOMIVAC was best equipped to do the job.

The SV presidents thought that the present system worked poorly, and that it would be better to have fertilizer on the spot at the time of peanut marketing. Not only would farmers be more ready to buy it, but the fertilizer would be easier to transport and farmers would have more time to incorporate the fertilizer in the soil in time for production of peanuts, millet, and maize.

Farmers interviewed were particularly disturbed by the late deliveries; 61 percent cited late distribution as the main problem with this year's campaign, followed by 10 percent citing the high prices. Only 5 percent said the distance covered to obtain fertilizer was too great. Farmers indicated a willingness to increase fertilizer use, but 41 percent stated that fertilizer was not available when they wanted it.

When asked about cash sales of fertilizer, 82 percent of farmers said it should be possible to buy fertilizer at the time of peanut marketing, while 10 percent preferred to purchase at the beginning of the rainy season. Only 4 percent said they would refuse to purchase fertilizer for cash.

Although willing to buy fertilizers, most farmers did not want the private traders to play a major role in the distribution. Regarding the preferred place of sale, 60 percent of farmers said the SV, 21 percent the cooperative, and 12 percent the secco; only 0.4 percent preferred purchasing from private traders.

Despite this high preference for the SV as the point of distribution for fertilizer, farmers were divided on what organization they thought could best replace SONAR in the event of a change in the distribution system. Forty-six percent said the Rural Community ("communauté rural") would be best, 11 percent said SONADIS (Société Nouvelle pour l'Approvisonnement et la Distribution au Sénégal), and 9 percent said SOMIVAC.

When asked specifically about the possible role of private traders, 37 percent of farmers said that traders should play no role, 31 percent said that traders should sell fertilizer from what are now SONAR seccos, and 21 percent thought that traders should provide credit.

Farmers were divided about their likes and dislikes of the present retenue system. Regarding aspects of the system farmers would like to preserve, 30 percent said the 5 CFA retenue per kilo of peanuts sold, 24 percent said they would preserve nothing, 19 percent said the principle of 40 kg of fertilizer per ton of peanuts sold, and 9 percent said they would preserve the whole system. Regarding aspects of the system farmers would like to change, 39 percent said the time of distribution (i.e., to eliminate delays), 21 percent said "change the whole system," 14 percent said to change the 5 CFA/kg retenue, 9 percent said "change nothing," and 5 percent said to change the principle of 40 kg of fertilizer per ton of peanuts sold.

In general, farmers appear to be more concerned about timeliness of distribution than about any other aspect of the system.

The SV presidents generally had similar views. Of the 51 presidents interviewed, 42 percent said they wanted to preserve the 5 CFA/kg retenue, 20 percent wanted to preserve nothing, and 18 percent wanted to preserve the rate of 40 kg of fertilizer per ton of peanuts sold. The SV presidents were also very disturbed about the late distribution. When asked what they would like to change, 46 percent said the timing of distribution, and 20 percent wanted the whole system changed.

VI. SURVEY RESULTS--SINE-SALOUM REGION

A. Background.

Since the dissolution of ONCAD in 1980/81, fertilizer distribution in the Sine-Saloum has been handled much the same as in the Casamance. During the 1980/81 and 1981/82 campaigns some short-term credit was available but the amount was significantly less than in pre-1980 days. By the 1982/83 campaign, all agricultural credit come to a halt except that available through specific projects. SODEVA (Société de Développement et de Vulgarisation Agricole) and SODEFITEX (Société de Développement des Fibres Textiles) have been the only rural development agencies offering fertilizer on credit. They work with a limited number of farmers signing contracts to produce maize or cotton. This year, for example, 599.5 tons of fertilizer were distributed to maize contractors who planted 1,998 hectares, and 1,498 tons to cotton contractors planting 6,090 hectares.[1/]

Farmers wanting to obtain fertilizer without signing contracts could make cash purchases from SONAR in 1982/83 at a price of 25 CFA/kg and from SODEVA in 1983/84 at 45 CFA/kg. During the 1981-84 period, fertilizer use declined radically from 39,052 tons in 1980/81 before credit was discontinued to a low of 287 tons in 1983/84.[2/] This very low level of sales apparently resulted from (1) a price increase from 25 to 45 CFA/kg, and (2) the small number of functioning sales points. The general decline in fertilizer use encouraged the government to institute the "retenue à la source" system as the first attempt since the 1980/81 campaign to distribute fertilizer systematically to a large number of farmers.

B. The Retenue System: Participants, Resources, and Operating Procedures.

The "retenue" system in the Sine-Saloum is essentially the same as that in the Casamance. The two primary actors this year were SONAR and the village sections. SONAR received fertilizer from its Dakar headquarters and was responsible for its distribution to the SV's, which distributed it to

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[1/] Sources: SODEVA/Kaolack, Division des Actions et Programmes, "Rapport Mensuel de Juin et Juillet, 1984," p. 8, for maize data; November, 1984, conversation with the Inspecteur de l'Agriculture, Kaolack, for cotton data.

[2/] Inspection Régionale de la Production Agricole, Kaolack, "Rapport Annuel sur la Campagne Agricole," 1980/81, 1981/82, and 1982/83. Also, SODEVA/Sine-Saloum, "Bilan Annuel de la Campagne 1983/84," December, 1983, p. 4.

their members. Because the "retenue" system is linked to the peanut marketing process, other actors are also important. Fertilizer cannot be distributed in a timely and correct fashion unless the record keeping and accounting procedures used during peanut marketing provide (a) the necessary documentation for calculating quantities of fertilizer owed to each SV and farmer, and (b) the transfer of "retenue" funds to fertilizer manufacturers.

Those who played important roles in 1983/84 peanut marketing were SONACOS (Société Nationale de Commercialisation des Oléagineux du Sénégal), the Cooperative Service, and SONAR's seed purchasing service. SONACOS and SONAR bought peanuts and recorded the quantities purchased at each collection point. During the 1983/84 campaign there were 504 official collection points staffed by SONACOS agents and 184 seccos where SONAR purchased seed quality peanuts. The Cooperative Service kept records on amounts sold at all SONACOS (but not SONAR) sales points. Some local administrative authorities collected information on amounts sold by SV's because they required those under their jurisdiction to do a census of members' sales receipts (particularly true in Kaffrine).

One final actor in the 1984/85 fertilizer distribution campaign was the private trader. His role this year was one of purchasing fertilizer from SV's who had received fertilizer too late and who wanted to convert it quickly to cash. The study did not include systematic interviews with traders; this is an important area for further investigation.

1. SONAR resources.

The SONAR network used for seed and fertilizer distribution included five large distribution points (Centres d'Eclatement de Produits Agricoles, CEPA's), and 184 smaller distribution points (seccos). All five CEPA's received fertilizer from Dakar; four dispatched it to seccos under their jurisdiction, and one distributed its full allotment directly from the CEPA. Only 88 of the 184 seccos actually functioned as fertilizer distribution points, however. (Note: the reported number of functioning seccos changed frequently during the distribution campaign; 88 is the best estimate available.)

SONAR's physical storage facilities vary. Some seccos have only open air storage; others have metal or concrete warehouses with cement floors. All seccos have one or more scales. In general, physical storage facilities and weighing equipment for fertilizer were not a problem.

Regarding SONAR's personnel, each secco is staffed for six months of the year (November through June) by a manager who until 1984 was responsible only for purchase of seed-quality peanuts and for distribution of seeds and fungicides. Staffing for the CEPA's is similar to that for the seccos; however, the CEPA's in Nioro, Kaolack, Kaffrine, and Gossas benefit from the presence of the "Coordinateur Départemental" (CO.D.), who has a permanent staff which can be called upon for assistance.

The 1984 SONAR transport fleet for the Sine-Saloum consisted of six functioning 10-ton trucks assigned to Kaolack. During fertilizer distribution, other public and private trucks were used.

2. Village section resources.

Law 83-07 of 28 January 1983 and MDR Circular 0051 of 5 September 1983 set forth the guidelines for restructuring the Senegalese cooperative sector using village sections as the basic unit. SV's must have a minimum of 300 members, and be composed of individuals living together in close geographic proximity and wanting to affiliate with each other; i.e., a single village or a group of neighboring villages which get along with each other.[1/]

All village sections geographically located in one of the 76 Rural Communities of the Sine-Saloum automatically become affiliated with a newly created "mother cooperative" designed to provide the SV's with leadership and liaison to local administrative authorities and other rural service organizations. Because of the important role envisioned for village sections by the "New Agricultural Policy," which calls for a significant transfer of agricultural support activities from the government sector to the sections, a descriptive profile of the 48 SV's sampled is presented below. Since these sections were randomly selected, they should be representative of the 1,179 sections located in the Sine-Saloum.[2/]

[1/] See HEDJAZI, Fayad, "Note sur l'intervention de la S.O.D.E.V.A. en matière de restructuration cooperative," SODEVA, Direction Technique des Opérations, Division Formation, Section Coopération, Mai, 1982, for a more detailed description of theory and practice in the establishment of village sections.

[2/] The number of village sections is based on a November 3, 1983, situation report by the Cooperative Service in Kaolack.

Of the 48 sections sampled, 79 percent were less than one year old at the time the study began. Seventy-five percent of the sections consisted of four or fewer villages, of which 27 percent were sections comprised of a single village; the remaining sections (25 percent) grouped 5 to 8 villages, with one extreme case of a section with 15 villages. During the course of the study, the Cooperative Service made some changes in the section affiliation of certain villages. This affected one SV sampled, which was informed that it had received the fertilizer allotment for a village which had apparently been added to the section without the prior knowledge and approval of the SV's officers. In other cases villages arbitrarily tried to change their affiliation. Some claimed allegiance to one SV for seed distribution and another for fertilizer distribution. Such "infidelity" was encouraged by the fact that quantities of seed distributed per farmer varied from one SV to another.

During the interviews with the administrative bureaus of each section, interviewers learned that the membership of sample sections varied from as few as 34 to as many as 1,312. Forty-six percent claimed to have fewer than the legal minimum of 300 members. When queried on the criteria for membership, the SV's offered a variety of responses which reflected less than full understanding of the laws concerning reorganization of the cooperative system. Among the criteria most frequently offered were:

a) all taxable individuals (male and female) living in the affiliated villages;

b) all taxable males living in the affiliated villages;

c) only members of the former peanut cooperatives automatically became members of the sections, all others must request membership;

d) membership is on request--all those living in affiliated villages can register as members.

Much of this confusion apparently stems from the fact that many sections were formed toward the end of the last agricultural campaign when harvests in general were poor. The cooperative service did not want to impose a financial burden on potential members by requiring a membership fee.[1/] Without such a fee, however, there exists no recognizable criterion for

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[1/] Source: conversation with Assistant Regional Controller, Cooperative Service, Kaolack.

distinguishing members from non-members which can be applied consistently across all sections.

In addition to confusion over who the members are, SV's have different interpretations about the rights of members versus non-members. The 1983/84 rules for peanut sales stated that prior membership in a cooperative or SV was not a requirement for selling peanuts at a particular sales point.[1/] Fifty-eight percent of SV's sampled served as sales points for the 1983/84 campaign; 21 percent of these SV's indicated that all sales at their section had to be made in a member's name. When large numbers of producers do not sell their peanuts directly, they may lose control over inputs paid for with their "retenue". The farmer survey confirmed that many sales were made indirectly--63 percent of farmers sampled sold some peanuts which they themselves did not produce, yet less than one percent reported giving "retenue" fertilizer to the actual producers. The fact that 21 SV's had no women members suggests that female producers in particular may not be well served by the "retenue" system.

The administrative bureaus of the sections surveyed consisted of 5 to 22 members with 73 percent of all bureaus having 5 members. All bureaus had at least one member literate in a local language, French, or Arabic. Twenty-five percent of sections had no one on their administrative bureau literate in French; 75 percent had at least one officer with French literacy and 38 percent had more than one. Because all SONAR, SONACOS and Cooperative Service documents are written in French, it is questionable whether bureaus without French literacy skills can adequately serve their members. The survey did not address the question of numeracy skills but, given the very complex calculations required to allocate fertilizer this year, numeracy could well be more important than literacy.

Many members of SV administrative bureaus tend to occupy other important positions in their communities. Thirty-three percent of the 48 sections reported that their bureau included at least one elected official serving in the rural community governing structure. Another 33 percent reported having a religious leader as a bureau member, and 29 percent had village chiefs on the bureau. Private traders were present in 33 percent of the bureaus. Only one of the 48 SV's had a woman as an officer.

[1/] This "rule" was discussed by Sayfou SALL, Technique Régionale, and Sidat DIAW, CO.D., Gossas, but no written statement of it was found.

Forty-seven SV's responded to a question about the number of officers who had served on governing boards of the former peanut cooperatives. All but 6 of the 47 had former cooperative leaders as members of their bureaus. These 47 SV's had a total of 282 officers of whom 90 had previous experience in running the peanut cooperatives.

The sections sampled own very few assets. None reported having a bank account, a meeting room, or an animal-drawn cart. Only 3 sections (6 percent) claimed to have a small warehouse. Only those sections serving as sales points (58 percent of the sample) had access to some type of scale.

The type of membership records kept by the section provides some indication of the section's maturity and ability to perform input distribution functions. Fifty-two percent of sections claimed to have a list of members, 27 percent had none, and the remaining 21 percent claimed the list existed but was maintained by the cooperative service or the administration. (Those stating that the administration kept the list usually believed that all taxable individuals were members and therefore considered the tax list to be a membership list.) Ninety-two percent had no accounting records (not surprising as no fees have been collected). Eighty-one percent claimed to have a list of member's peanut sales for 1983/84 but only 25 percent had developed the list themselves. The Cooperative Service and the SONACOS weigher were often cited as those responsible for keeping the list up to date.

In general, it is clear that the sections need help to set up the record keeping procedures required by their new input distribution and sales functions. During informal talks with SV administrative bureaus, the need for training their officers was often mentioned. Unfortunately the resources currently available for this training are limited. In the Sine-Saloum, 25 ABC's (Agent de Base de la Coopérative) must assist 1,179 different SV's--i.e., an average of 47 SV's per ABC.[1/] None of the ABC's have their own means of transportation, hence they seldom visit the SV's under their jurisdiction.

3. Operating procedures.

During the study, three categories of SONAR operating procedures were identified as being critical to the smooth functioning of the fertilizer distribution program:

[1/] The number of ABC's was obtained during informal interviews with the Assistant to the Assistant Regional Controller of the Cooperative Service, Kaolack.

a) procedures to assure a continuous flow of information concerning distribution from Dakar to Regional Directors and on to CO.D.'s, CEPA's, seccos, and fertilizer recipients;

b) procedures to calculate quantities of fertilizer to be delivered to seccos and sections;

c) procedures for assuring that available human and physical resources were in place and efficiently utilized for transportation and distribution of fertilizer within the six departments.

At the village section level, procedures had to be developed to perform the following tasks:

a) determine who would have responsibility for direct dealings with SONAR;

b) determine how to handle transportation of fertilizer (in cases where transport was necessary);

c) design an appropriate system for distributing the section's allotment of fertilizer among members and other claimants.

In general, SONAR encountered a number of problems in defining and implementing these operational procedures. Poor information flows between the regional office in Kaolack and CO.D.'s appear to have caused significant uncertainty and delays throughout the Sine-Saloum during May and June. It is not clear whether the cause of this information problem was poor dissemination by the regional director or an absence of clear directives from Dakar to the regional headquarters. Calculating the quantities due involved time consuming procedures, and results were often disputed by sections and farmers. The establishment of operational procedures for efficient use of SONAR personnel and trucks, as well as private truckers, was hampered by a number of factors, many beyond the control of the SONAR regional office.

In general, the president of the section and/or the members of the administrative bureau handled all negotiations with SONAR and arranged for transportation. While the decisionmaking process tended to be similar, the decisions varied significantly. This same variation is found in the system used by each section to distribute its fertilizer allotment.

Further discussion of the actual operational procedures adopted by both SONAR and the SV's is presented in the next section on the fertilizer campaign.

C. The Fertilizer Campaign.

The distribution activities performed by SONAR and the village sections are described first, followed by farmer utilization of fertilizer.

1. SONAR's role in the distribution campaign.

a. Program of activities and fertilizer movements. SONAR's regional office in Kaolack was assigned the task of distributing 10,136 tons of fertilizer throughout the six departments of the Fatick and Kaolack regions. SONAR-Kaolack personnel stated that they had no role in determining the type and quantity of fertilizer allocated to the Sine-Saloum. The Inspector of Agriculture confirmed this, stating that the Ministry of Rural Development in Dakar made all such decisions. Table 8 presents the fertilizer allocation program as it was communicated to SONAR's Kaolack office. The right side of the table shows the fertilizer allotments and the left hand side shows the quantity of peanuts sold and value of the "retenue" corresponding to each allocation of fertilizer. According to this schedule, a total of 55 kg of fertilizer was to be distributed for each ton of groundnuts sold to SONAR and/or SONACOS, i.e., 17 kg of urea, 23 kg of 14-7-7 and 15 kg of 6-20-10 for each ton. In theory, it was the responsability of each region to calculate the quantities of fertilizer due to individual sections and to distribute supplies rapidly throughout the network of CEPA's and seccos so as to minimize the travel and transportation costs of sections and assure timely application of fertilizers.

The distribution campaign got off to a slow start. The first shipments of fertilizer from Dakar did not arrive until the beginning of May and kept trickling into the region during June, July, and the first part of August. Figure 8 illustrates the pace of fertilizer placement at the 5 SONAR CEPA's during the 21 week distribution period (7 May through 18 September), and the timing of its onward movement to SV's. Annex Tables 11 and 12 present similar information but report the data by department and do not distinguish between NPK and urea.

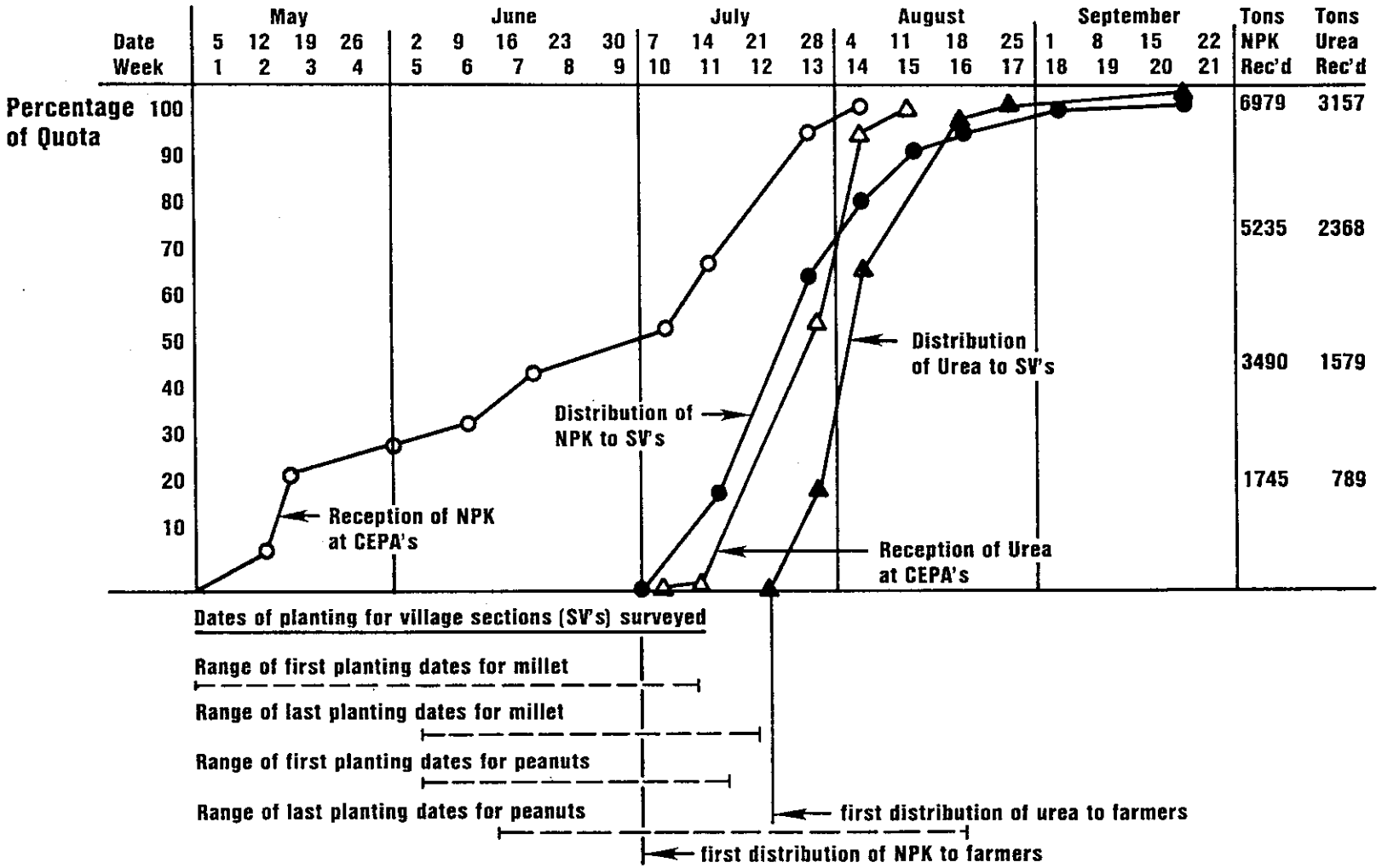
The fact that more than 50 percent of fertilizer was delivered to SV's at the CEPA's rather than through the seccos makes it impossible to graph the distribution in three stages (CEPA to Secco to SV) as was done for the Casamance. Furthermore, SONAR weekly reports often did not make a clear distinction between distribution to SV's and shipment to seccos. For example, in one report the amounts delivered to Foundiougne SV's were identical to the amounts dispatched to Foundiougne seccos in the same week, although it is unlikely that these seccos all distributed their entire

Table 8. Fertilizer Distribution Schedule, Sine-Saloum, 1984.

Department or CEPA	Peanut Sales (CFA) SONACOS	SONAR	TOTAL	Value of the Retenue	Percent Regional Retenue	Fertilizer Entitlements (kilograms) Urea	14-7-7	6-20-10	TOTAL
Fatick	8,818,353	6,984,359	15,802,712	79,013,560	8.57	270,680	359,050	239,400	869,130
Foundiougne	17,234,068	6,071,264	23,305,332	116,526,660	12.64	404,350	532,800	356,550	1,293,700
Gossas	17,311,686	7,571,612	24,883,480	124,417,400	13.50	426,220	565,400	376,900	1,368,520
Kaffrine	26,596,912	13,128,177	39,725,089	198,625,445	21.56	680,480	902,600	601,750	2,184,830
Kaolack	13,640,931	1,668,568	15,309,499	76,547,495	8.31	257,070	344,600	228,350	830,020
Koungheul	27,794,278	0	27,794,278	138,971,390	15.08	476,080	631,500	421,000	1,528,580
Nioro	33,164,931	4,307,000	37,471,931	187,359,655	20.33	641,840	851,400	567,600	2,060,840
Region	144,561,341	39,730,980	184,292,321	921,461,605		3,156,720	4,187,350	2,791,550	10,135,620

Source: Compiled from SONAR documents and informal interviews with SONAR personnel, 1984.

Figure 8. Timing of Fertilizer Distribution, Sine-Saloum, 1984.



allotment in one week. For this reason, amounts reportedly delivered to SV's for a given date are probably somewhat over-estimated.

By July 7 (9 weeks after the first fertilizer deliveries to the region) CEPA's had received slightly more than 50 percent of scheduled NPK and distribution to SV's was just beginning. By the 28th of July, 95 percent of NPK had been received and about 65 percent distributed to SV's; one week later, 95 percent had reached SV's. Urea did not begin arriving at the CEPA's until the second week in July, with distribution of 95 percent of allotment being achieved by the first week in August. Distribution to sections began between the 3rd and 4th weeks in July, passing the 95 percent mark by the third week in August.

There were significant differences in the timing of fertilizer delivered to and distributed from different CEPA's. Nioro and Kaolack began reception in early May while Kaffrine, Koungheul, and Gossas received no supplies until the end of June and beginning of July. Koungheul was slowest in getting fertilizer out to SV's but it was also one of the last to receive its full allotment. (See Annex Tables 11 and 12.)

It is difficult to draw any clearcut inferences about the effect of late deliveries on the efficiency of the fertilizer used. Twenty-one percent of farmers said they were unable to use all fertilizer due to late deliveries; an additional 5 percent could not use it all due to inadequate rain after delivery. It was clearly not possible for most farmers to apply NPK at the time of land preparation, as recommended by ISRA research. The bottom half of Figure 8 shows the range of first and last planting dates reported by SV's surveyed. Only those few farmers who planted relatively late in the season could have applied NPK during land preparation.

Peanut NPK should be applied after the plant has become well established but not later than the last weeding. SODEVA estimates that 50-80 percent of peanut weeding was completed by 31 July while only 65 of NPK had reached village sections by this time. NPK application on millet is not recommended any later than 21 days after crop emergence. SODEVA estimates that 50 percent of millet had been planted by the second week in June, yet only 20 percent of NPK had been distributed by the second week in July.[1/]

[1/] Source for recommended timing for fertilizer applications: I.S.R.A. Centre National de Recherches Agronomiques de Bambey, "Fiches Techniques Etablies en vue de la Réalisation de l'Experimentation Agronomique (Campagne 1979-80)," April, 1979. Source for actual planting and weeding dates for 1984/85: estimates from the Division des Actions et Programmes, SODEVA.

If rainfall is adequate, urea should be applied 8-10 days after emergence and again 45 days after emergence. Urea was clearly not available in time for the first application but most farmers probably received it within 45 days of emergence. In fact, urea deliveries started shortly before a prolonged dry spell during most of August in many areas of the Sine-Saloum. Although Ganry and Guiraud suggest that urea is not completely lost if used in low rainfall years, most farmers did not use their allotments since they thought urea should not be applied without adequate rainfall.[1/]

The reasons for delay in shipments from Dakar are better researched in Dakar than at the regional level. Nevertheless, SONAR CO.D.'s and other higher ranking administrative personnel were asked for their ideas about what caused the delays. The most common responses were (1) the ICS did not receive the raw materials early enough to fill the government's order, and (2) the government was unable to pay the suppliers on time.

The delay in shipments was compounded by inactivity within the region during May and June. Informal discussions with CO.D.'s and SONAR administrative personnel elicited the following explanations for the inactivity.

a. Distribution could not begin until stocks were complete.

b. SONAR had no budget to pay private transporters and insufficient trucks of its own to accomplish the task.

c. The government was still looking for a subsidy and therefore distribution procedures could not be finalized.

d. The government was not able to pay for the fertilizer required to fulfill the retenue obligations and this caused delays in deliveries and uncertainty about final quantities to be received.

Whatever the cause, CO.D.'s in each department were not instructed by their supervisors in Kaolack to begin distribution until the first week in July. At this time, due to inadequate transport, village sections were told that they could go to the CEPA's and claim their fertilizer if they could arrange to transport it back to their villages. Many sections (19 of 48 sampled) went to the CEPA's--at considerable expense--and arranged for the shipment of fertilizer back to their villages. By mid-July this policy was severely criticized by farmers as well as by the local administration. SONAR

[1/]See Ganry, F., and G. Guiraud, "Efficacité de l'engrais azoté en année sèche à Bambey: Rôle de la matière organique, CNRA/IRAT, March, 1974.

was obliged to change the regional director in Kaolack and to make every effort to move fertilizer supplies closer to the final recipients.

Most fertilizer appears to have been distributed directly from CEPA's to sections with the latter bearing transport costs. Gossas was the only CEPA to distribute all of its fertilizer through the seccos. Direct distribution from CEPA's to sections accounted for 61 percent of tonnage in Nioro, 47 percent in Kaffrine, and 100 percent in Koungheul. The tonnage figures are not available for Kaolack, but seccos functioned in only one of Kaolack's three "arrondissements"; SV's without functioning seccos took delivery in Kaolack. Figures for tonnage delivered to Foundiougne and Fatick SV's at the CEPA are also not available, but many SV's travelled to Kaolack rather than waiting for SONAR to arrange for shipment to the seccos.

Some SV's are holding SONAR responsible for "breach of contract" and are demanding reimbursement for transportation costs associated with delivery at the CEPA rather than the secco. In early October CO.D.'s were asked to make a list, by SV, of tonnage delivered at CEPA's so that estimates could be made of transport costs to be reimbursed. So far as is known, this reimbursement has not yet been made.

Annex Table 13 summarizes the information on timing of fertilizer movement for the 20 seccos surveyed and for the Koungheul CEPA (which distributed only to SV's). In 14 of the 21 cases distribution began within 5 days of the first delivery to the secco. In the remaining seven cases the delay between first delivery and first distribution ranged from 12 to 25 days; in each of the seven cases, the manager did not want to start distribution before his stocks were complete. Exact distribution termination dates are available for only 17 seccos. For these 17 the entire distribution period ranged from 12 to 65 days. The extreme case of 65 days is the CEPA at Koungheul which served 118 geographically dispersed sections and managed to terminate within 12 days of its last shipment from Dakar. Ten seccos finished distribution within five days of last delivery.

Losses occurring during shipment from CEPA's to seccos in the sample were small. A single case of one secco receiving 40 kg less than the quantity dispatched was reported. An interview with one CO.D. also revealed a loss of 1,000 kg between Kaolack and Fatick; the transporters were being held responsible and were expected to reimburse the missing amount. Secco losses were not obtained for the entire SONAR network, but they are unlikely

to be very high. Losses were kept to a minimum by the fact that managers often accompanied the shipments to their seccos.

b. Adequacy of SONAR resources. Secco managers were asked about the adequacy of SONAR resources and personnel for the fertilizer distribution activities. All agreed that storage facilities (whether indoor or open air) and weighing equipment were adequate. Ten of the 21 managers encountered some problems due to a lack of sacks for packaging small amounts of fertilizer. Managers generally asked the sections to provide their own sacks.

Personnel needs are less clear. Ten managers claimed that their personnel was adequate; however, one of the ten reported working very long hours, nights and weekends. The remaining eleven felt that SONAR should have directly employed some additional personnel at the seccos. While it is clear that a number of managers suffered "peak load" personnel problems, the requests for additional personnel do not generally appear justified and are not related exclusively to fertilizer distribution activities. The current system of using day laborers paid by the ton for loading and unloading trucks makes it difficult for SONAR personnel to ensure speed and efficiency. The system provides no incentive for individual laborers to work quickly, nor for work groups to use all the workers present since that diminishes the take-home pay of each individual person. Handling operations were also often less efficient because SONAR agents did not have the cash on hand to pay work goups on a daily basis, resulting in worker dissatisfaction and slowdowns. This year, costs of fertilizer handling within the Kaolack and Fatick regions were 3,134,441 CFA.[1/] It is difficult to judge whether a different system of hiring laborers could have reduced costs and speeded up operations.

A more critical personnel problem is that only one individual has the authority to receive and distribute stocks at a given secco. If the manager is ill or called to Kaolack, his secco remains closed. A system of shared or delegated authority appears to be lacking. In one case, a CO.D. went to visit a secco where the manager had been absent for several days due to illness. Although eight trucks had been at the site for over twelve hours, the CO.D. was unwilling to accept the responsibility for opening the secco and loading the trucks without telephoning the manager (who was more than 170 kilometers away) and getting his permission.

[1/] Cost data were obtained from the Head Accountant, SONAR, Kaolack, October 31, 1984.

One personnel problem posed by this year's fertilizer campaign which could have been avoided was that secco managers were required to work beyond the end of their six-month contracts. Many managers had left their posts by the time fertilizer arrived. Some were called back; others could not be contacted (most managers do not live in close proximity to the seccos where they work). Those who worked beyond the end of their contracts suffered a number of personal hardships. Many complained that SONAR did not give them advance notice of these extra duties. None received salary payments until September for the extra time worked. Even when payment was finally received, many managers felt they had not been paid for the full number of days worked. A number of managers who are also farmers were unable to cultivate their fields this year. In all, SONAR-Kaolack incurred an extra 11,279,490 CFA in salary obligations to secco managers due to the delay in fertilizer shipments from Dakar.[1/]

While personnel constraints were responsible for some delays in distribution, the major culprit was inadequate resources for transporting fertilizer from CEPA's to seccos. Even after SONAR changed the regional director and made a concerted effort to deliver to seccos, transportation remained a significant problem due to SONAR's limited truck fleet. One CEPA manager reported that the problem was further compounded by the fact that many SONAR chauffeurs had already begun their annual holidays when distribution began, leaving SONAR with a few trucks and no drivers. SONAR trucks in other regions were still evacuating peanuts and distributing seeds, and hence could not be made available immediately. Rumors that SONAR was being phased out of existence convinced private truckers that their chances of being paid were slimmer than usual. By mid-July a few private transporters had begun to accept assignments and 8 trucks belonging to the URCASS also assisted. SONAR had to encourage private transporters by providing the diesel fuel and paying for laborers to load and unload the trucks, costs normally borne by the transporter and covered by the fixed fee per kilometer ton which the government pays. In most cases, SONAR advanced these inputs in kind, the value to be subtracted from final amounts due to each transporter. Eight SONAR trucks from Thiès and 2 from Louga were also put into service during the latter part of the distribution campaign. Some

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[1/]Source: Head Accountant, SONAR, Kaolack, October 31, 1984.

confusion arose as to whether SONAR or the SV's were hiring and paying for these trucks (particularly true in Nioro).[1/]

After finally getting distribution activities off the ground in July, SONAR experienced a slowdown in early August due to a lack of diesel fuel; trucking between CEPA's and seccos literally halted for two weeks. This shortage of diesel fuel seems to have been a government-wide phenomenon.

Total transportation costs incurred by SONAR-Kaolack could not be estimated as all bills are submitted to SONAR-Dakar. Because transportation was a major bottleneck, a thorough study of all transportation costs incurred by SONAR as well as by village sections would provide useful information for those designing and estimating costs of future input distribution campaigns.

c. Calculation of village section fertilizer allotments. In addition to the logistics of fertilizer shipping, serious difficulties were encountered in calculating the quantities to be delivered to various seccos and village sections. Each CO.D. was responsible for calculating the quantities to be delivered to seccos under his jurisdiction, and for providing the secco managers with a list of quantities owed to each section. This delegation of authority to the departmental level led to substantial differences in the procedures followed from one department to another.

The Nioro CO.D., for example, collected copies of all SONAR and SONACOS sales records for the 83/84 campaign and examined each individual sales record in order to determine the SV of the seller. The fact that 83/84 sales reports indicated the sales point and the seller's home village but not his village section made the task extremely difficult; the CO.D. had to refer to another list which showed the SV affiliation of each village. In theory, each of the 152 SV's in Nioro department was supposed to receive the quantity of fertilizer corresponding to sales by their members, so that farmers who sold at different sales points would not have to worry about distributing to non-members. In general, relatively few problems were experienced with implementing this system: some errors in sales records which were detected after distribution of NPK but before distribution of urea were rectified by adjusting quantities of urea; some sections did not understand the system and inadvertently gave fertilizer to non-members who had sold at their section;

[1/] Information about trucks was obtained from Sayfou SALL, Technique Régionale, SONAR/Kaolack. Comments about problems in paying URCASS were obtained from Serigne DIOP, CO.D., Nioro.

and some problems occurred because the SV and the CO.D. had conflicting information on the villages attached to a particular section.

The system employed in Gossas was quite different. The CO.D. did not interpret the instructions he received to mean that allotments were to be calculated for each SV--in fact he was quite surprised to learn that several of his colleagues had attempted this. For him it was an impossible task because he did not have access to SONACOS sales records. He developed a hybrid system. For SONACOS sales he calculated the amount of fertilizer corresponding to the level of sales for each sales point (sales points were SV's--but only 73 of the 116 SV's in Gossas served as official SONACOS sales points). This meant that all farmers who did not sell at their own section had to go to the SV where they did sell to collect their "SONACOS" fertilizer. Those who sold at several different points (which often occurred because sales points ran out of money) had to go to these same points to collect their fertilizer. For SONAR sales, the CO.D. had records by SV and allocated quantities for these sales to each individual section.

Even using this apparently simplified system of distributing allotments, the CO.D. spent about 2 weeks collecting the necessary information and doing the calculations. The major shortcoming of the system was that it left the burden on members of SV's without sales points to get their fertilizer from other sections. A number of farmers surveyed claimed to have been unsuccessful in this endeavor. Another problem was that members of SV's who sold at sales points run by SV's of a different ethnic group did not think their neighbors gave them their full allotments. These SV's believe the only solution is for them to have their own sales point (not a practical solution from a SONAR/SONACOS perspective).

Kaffrine used a third method of calculating allotments. Distribution was based on the individual SV as in Nioro. Rather than using SONACOS and SONAR documents, however, the CO.D. used results of a census of sales receipts which had been imposed on all SV's throughout Kaffrine by the local administration. Unfortunately, by the time the census was conducted many farmers had already lost their receipts or were travelling and missed the census. By basing distribution on the census (even in cases where he knew census amounts were less than amounts shown in SONACOS and/or SONAR sales records) the CO.D. (as well as the local administration and the Cooperative Service) became involved in a very time consuming task of after-the-fact

rectification. Almost every SV surveyed reported cases of omitted farmers who were not in the census but who had sales receipts to justify claims for fertilizer. Each omitted farmer was obliged to contact the local cooperative agent, the "préfet" and finally SONAR to present his claim and receive fertilizer. In many cases, fertilizer was not received because SONAR stocks were depleted by the time approval was received.

The department of Kaolack offers a fourth model. The CO.D. delegated full responsibility for calculating SV allotments to the Kaolack DAC (Departmental Cooperative Agent) who had an office in the same building as to CO.D. The DAC recognized that distribution was to be done at the level of individual sections, not sales points. Like the CO.D. of Gossas, he considered it an impossible task to review every single sale registered by SONAR and SONACOS in order to establish such a list. The DAC made a list of all sales points and corresponding tonnage in peanut sales. In collaboration with SONACOS weighers and using his knowledge of the department, he made educated guesses about which SV's sold at which sales points. The result was a list of all SV's having an interest in the fertilizer paid for by that sales point's "retenue." The next step was to decide how the fertilizer due to each sales point would be allocated among the associated SV's. The solution was to do a proportional distribution of NPK based on the number of taxable people in each SV and wait for those who felt they had been short-changed to protest. Urea distribution was held up until SV's had had sufficient time to register complaints. The complaints were examined and an attempt was made to identify the SV's having received too much. The plaintiff received extra urea and the beneficiary of the original error received less than the normal allotment.

The DAC is the first to admit that this was not an ideal system but he was surprised at how few complaints he received and felt that, in general, SV's obtained close to what their "retenue" had paid for. Among those Kaolack SV's surveyed, one claimed that it received fertilizer for more than two times the amount of peanut sales made by members; one felt it did not receive fertilizer for the SONAR sales (approximately 23 tons); three were unable to judge as they knew only the total tonnage sold at their sales point not the tonnage sold by members; and two gave interviewers approximately the same tonnage as the DAC had allocated them.

Time constraints made it impossible to obtain detailed information on how Fatick and Foundiougne allotments were calcutated, but both CO.D.'s said that distribution was based on individual SV's not on sales points. SV's sampled in Fatick reported sales tonnages fairly close to those calculated by SONAR, or suggested that SONAR's figures were probably more exact. Four of six SV's surveyed in Foundiougne claimed, however, to have received credit for only a small portion of their sales (the four sections together claimed about 438 tons more in sales than SONAR gave them credit for). Of the remaining two SV's, one thought its allotment was approximately correct and the other had no idea about what its sales were, but thought it had been short-changed. Charges that secco managers were uncooperative and refused to give SV's sales tonnages were much more common in Foundiougne than other departments (SONAR personnel were more criticized than SONACOS).

Given the difficult task assigned to the CO.D.'s, it is not surprising that SV's failed to receive a uniform quantity of fertilizer per kilo of peanut sales. Using data obtained from SONAR on quantities of peanuts sold by the SV's sampled and the quantities of fertilizer received, the number of kg of fertilizer allocated per ton of sales was calculated.

In 7 of the 48 cases there appear to be errors in the SONAR calculations of 5 kg or more per ton (i.e., 3 sections received less than 50 kg and 4 sections received greater than 60 kg per ton). All 7 sections, however, fell within the range of 45-65 kg. The remaining 41 sections received 50-60 kg per ton.

d. SONAR-SV disaggreements concerning allotments. The above section dealt with calculations based on SONAR records. The amount of fertilizer received per ton is more variable when calculated using the quantities of peanuts which SV's believe they sold. The sources of disaggreement between SONAR and SV sales figures could not be identified in all cases, even after conducting follow-up visits to 41 of the 48 SV's surveyed. What is clear is that most SV's did not have precise knowledge of their members' peanut sales. Only 26 of the 48 sections conducted a census of members' sales receipts and even these sections had to depend on help from SONACOS weighers, ABC's, DAC's and SONAR managers to accomplish the task and develop a fertilizer distribution list. On the other hand, it is clear that SONAR personnel did not always have accurate sales data, and, even when they did, errors in assigning quantities to the correct section were not uncommon.

Eleven sections reported approximately the same weight of peanut sales as shown by SONAR (i.e., within 500 kilos). Of the 11, only 6 actually did a census of receipts; the others reported weights given to them by the Cooperative Service or the SONACOS weigher. Ten SV's did a census of receipts which resulted in a lower quantity sold than SONAR reported. Most of these sections believe the SONAR amounts are correct and their short-falls were due to lost receipts or members who were absent during the census. Three SV's reported having no idea of their members' sales and complained that both SONAR and SONACOS weighers would not help them do the necessary calculations. Four sections knew the sales figures for their sales point, but these were not comparable to SONAR's figures which were by individual sections.

Nineteen sections reported sales figures which were different from those used by SONAR for calculating fertilizer entitlements; five sections appear to have received too much fertilizer while 14 received too little. Thirteen of the 19 sections are outside of the 45-65 kg/ton range. The 5 SV's which thought they were over-credited for sales benefitted from about 5,929 kg of fertilizer; the 14 which thought they were shortchanged lost about 52,283 kilos. The quantities in question amount to almost 10 percent of the total amount of fertilizer received by the 48 SV's. Again, it must be stressed that in these 19 cases it was not possible to ascertain whose sales figures were the correct ones--those of the SV's, or of SONAR/SONACOS.

2. Role of the Village Sections in the Distribution Campaign.

For many village sections, fertilizer distribution was the first group activity in which they became involved. As explained earlier, most village sections in the Sine-Saloum were only created in late 1983; few have any resources owned by the section.

The following paragraphs describe how 47 of the 48 sections sampled were notified of the distribution campaign, and how they organized to obtain and distribute their fertilizer. The percentages reported in the following discussion add up to only 98; the remaining 2 percent represents one section which did not receive fertilizer.[1/]

[1/] In Gossas, where distribution was done primarily by sales points, one section received no fertilizer because it was not an official SONACOS sales point and none of its members had sold at SONAR. Members who had sold at various SONACOS collection points were obliged to seek their fertilizer at those points; some were successful, others were not.

a. SV organizing for reception of fertilizer. Once the distribution campaign began, news travelled fast from SONAR to sections and farmers. Thirty-three percent of all sections were informed by word-of-mouth, 25 percent were notified by a SONAR agent, 13 percent by an official of the Rural Community, 6 percent by a cooperative service agent, 4 percent by radio, and the rest by other means.

In organizing to contact SONAR and to arrange for transportation and distribution, the president of the section took the initiative in 42 percent of the cases; in 27 percent the administrative bureau held a meeting to decide on procedures; 19 percent called a general assembly, and the remaining 10 percent employed other means. Responsibility for direct negotiations with SONAR was taken by the president alone in 42 percent of the sections and by the administrative bureau in 25 percent. A special committee was created by 17 percent of the sections and 4 percent relied on someone from the Rural Community. The remaining 10 percent designated other SV members to perform the negotiations.

Contacts with SONAR to arrange delivery often involved a number of visits by the responsible individuals. Only 12 percent of sections managed to complete all negotiations and take delivery in one trip; 29 percent made from five to ten trips. For many sections, the multiple trips were time consuming and costly due to the long distances separating the sections from the SONAR distribution points. In a few cases, due to confusion about what secco or CEPA was serving a particular section, the section representative had to travel to more than one distribution point before taking delivery.

As mentioned above, a large portion of Sine-Saloum fertilizer was turned over to SV's at the CEPA's. This was originally forced on the sections, but even after distribution to the seccos began a number of sections preferred going to the CEPA's. The reason for this is not clear, but SONAR personnel believe that those sections which had decided to sell their fertilizer preferred receiving it at the CEPA's where private traders were more readily available to buy it. The survey data tend to support this theory, showing significantly higher sales by sections taking delivery at the CEPA's.

b. Transportation of fertilizer by village sections.

(1) Transportation costs. In the sample of 47 sections which received fertilizer, 19 took delivery of all or part of their allotment at the CEPA. Of the 19 sections dealing directly with the CEPA's, 17 had

cash transportation costs. Of the two without cash costs, one required all members to arrange their own transportation and the other sold all fertilizer at the CEPA. For 13 sections, the data permitted calculation of costs per kg and costs per ton kilometer. These costs are presented on the left side of Table 9.[1/] Variability is high with costs per kg ranging from 0.8 to 6 CFA and costs per ton kilometer from 21 to 960 CFA. The average cost per kg was 3 CFA. The average cost per ton kilometer is only 54 CFA--lower than rates paid by all but one SV. A more representative average of 145 CFA is obtained by eliminating the extreme case of 21 CFA which was paid on a 120 kilometer haul (other hauls averaged only 21 km).

Transportation costs paid by SV's taking delivery at seccos were less variable. Costs per kg tended to be lower (1.5 CFA on average) but cost per ton kilometer tended to be somewhat higher (155 CFA on average). The costs presented on the right side of Table 9 are based on data from 11 of 14 SV's which incurred cash transportation costs between the seccos and the SV. Of those SV's taking delivery at seccos, 14 had no cash transportation costs and 3 incurred costs which could not be analyzed on a ton kilometer basis.

Two conclusions can be drawn concerning transportation costs: (1) SV's taking delivery at CEPA's paid a higher total cost per kg of fertilizer (i.e., "retenue" plus transport) than those taking delivery at seccos; and (2) the government approved rate of 23-25 CFA per ton kilometer for fertilizer transportation is not a realistic estimate of costs when SV's must negotiate transportation of relatively small quantities to remote locations. The higher costs paid by SV's taking delivery at CEPA's are only partially reflected in the price per kg differential shown in Table 9 (i.e., 1.5 CFA versus 3 CFA) because these calculations only deal with sections which actually incurred cash transport costs. The fact that many (13 of 28) SV's taking delivery at seccos incurred no cash transport costs while only one SV transporting from CEPA to SV had no cash costs increases significantly the difference in total cost per kg paid by the two groups.

The variability in rates per ton kilometer and the fact that rates paid by SV's were consistently greater than authorized rates raise some important

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[1/] It should be noted that the cost data shown for all sections deals only with costs of fertilizer transportation and handling. Other costs were incurred for trips by SV representatives to SONAR distribution points and several SV's mentioned paying bribes to chauffeurs and secco managers in order to expedite deliveries.

Table 9. Transportation and Handling Costs Incurred by Village Sections in the Sample, Sine-Saloum, 1984.

Delivery at CEPA				Delivery at Secco			
CFA Cost Per Kg	Transport Type a/	CFA Cost per Ton/Km	Transport Type a/	CFA Cost Per Kg	Transport Type a/	CFA Cost per Ton/Km	Transport Type a/
0.80	C	21	T	0.20	C	125	T
0.90	C	75	T	1.00	C	133	T
1.70	C	85	C	1.00	C	142	C
2.40	T	117	T	1.10	C	174	T
2.50	T	131	C	1.50	C	176	C
2.60	T	135	T	1.50	C	187	C
3.00	T	138	T	1.50	C	200	C
3.40	C	145	T	1.60	T	214	C
3.50	T	167	C	1.90	T	222	C
3.90	T	171	C	2.50	T	226	C
4.00	T	201	T	3.00	T	231	T
5.00	C	224	T				
6.00	T	960	C				
3.05 = average		54 = average b/		1.53 = average		155 = average	

Source: Field survey data, 1984.

a/"T" represents truck transport; "C" represents cart transport.

b/The adjusted average is 145 CFA per ton/km, eliminating one extreme case of 21 CFA paid on an unusually long haul of 121 km.

questions. The variability in rates is difficult to explain. As Table 9 indicates, type of transportation used (truck versus animal-drawn cart) is generally not correlated with cost. In a few cases, SV's made deals with chauffeurs working for SONAR, URCASS, and private truckers without consulting the owners; in these cases it is possible that rates charged reflect a return on the risk taken by the chauffeur rather than actual transportation costs. In several cases SV's indicated that they did not know the standard trucking rates and could not evaluate the representativeness of rates paid. Other SV's felt they paid high rates but recognized that the roads were in bad condition and that truckers often had to charge high ton kilometer rates because the trucks were not full. SV's tended to be better informed about cart rates and felt they paid average or below average rates. In any case, one must ask whether or not total transportation costs could have been reduced had SONAR or the Regional Cooperative Union organized the transport and tried to take advantage of economies in combining shipments to neighboring SV's. Furthermore, the transport cost data suggest that the approved government rate is quite different from those charged for non-government jobs. This could mean that farmers will pay substantially higher prices for inputs if farmer organizations are given increased responsibility for input distribution without sufficient training and logistical support.

(2) Methods of payment. Methods used by sections to cover cash transportation expenses were diverse. Twelve sections requested reimbursement from farmers according to the quantity of fertilier received; 9 paid by selling fertilizer; 3 sections had a fixed rate of reimbursement irrespective of the quantity of fertilizer received; 2 sections financed transport partly from member contributions and partly from fertilizer sales; two paid in kind, with fertilizer or sacks; and one sold the empty fertilizer sacks.

In a number of cases it appears that individual members did not fully reimburse transportation costs. This problem was raised during several section interviews and was confirmed by farmer interviews where no transportation expenses were reported by those belonging to sections where reimbursement was supposed to have been made.

(3) Distances travelled. Distances travelled to arrange for deliveries and for actual transport were substantial. The average distance

travelled round-trip per visit to the CEPA was 45 km, with a range from 2 to 70 km. (These calculations do not take into account a special case where the SV was 25 km from the CEPA but fertilizer had to be transported 120 km because the shorter route was inaccessible by truck after the first rains.) SV's made an average of 3.6 round-trips to the CEPA's (the range being from 2 to 7 trips).

SV's taking delivery at seccos also had to make several trips (2.6 on average with a range from 1 to 10). However, the average round-trip distance travelled was only 20 km, less than half the average distance travelled to CEPA's.

c. Sales. Twenty-three of 47 SV's receiving "retenue" fertilizer sold part of it. The total of 82,832 kg sold represents 14 percent of the "retenue" fertilizer received by the sections surveyed. Table 10 illustrates the relationship between total amounts received and sold by SV's surveyed in each department. Sixty-nine percent (57,518 kg) of fertilizer sold was urea. Fifteen of the 19 SV's taking deliveries at the CEPA's accounted for 88 percent of sales and 8 SV's taking delivery at seccos accounted for the remaining 12 percent. Thirty-one percent of fertilizer delivered to sample SV's at the CEPA's was sold. The fertilizer sold by SV's taking delivery at seccos represented only 3 percent of the total allotment received by this group. The proceeds of 76 percent of fertilizer sold were distributed among members; the remaining 24 percent was sold to cover transportation costs and other related expenses. The fertilizer was sold for an average price of 22.6 CFA per kg.

The reasons for these fertilizer sales are unclear. All SV's selling urea claimed that it arrived too late, yet other SV's sampled in the same zones distributed urea to members who made individual decisions about using and/or storing it. A number of SONAR employees have suggested that urea was sold in part because many farmers--particularly those specializing in peanuts--do not know how to use the urea. A number of farmers and SV's did comment that they were unfamiliar with urea. Some farmers also mentioned that they would never store urea at home because it is a toxic product particularly dangerous to children and domestic animals.

Although this study included no systematic survey of fertilizer sales in weekly markets, informal observations were made by one of the ISRA/BAME (Bureau d'Analyses Macro-Economiques) interviewers who was visiting markets

Table 10. Reception and Sales of Fertilizer by Village Sections, Sine-Saloum, 1984.

Department	Kilograms Received	Kilograms Sold	Percent Sold
Fatick	63,200	200	< 1
Foundiougne	67,600	250	< 1
Gossas	70,103	1,750	2
Kaffrine	192,545	11,640	6
Kaolack	30,350	11,300	37
Nioro	184,600	57,692	31
TOTAL	608,398	82,832	14

Source: Field survey data, 1984.

regularly during the month of July. During the period of 15-29 July, the interviewer saw large quantities of fertilizer for sale in nine weekly markets (Ndrame Escale, Ndiedieng, Ndiba Ndiayene, Prokhane, Dinguiraye, Passy, Sokone, Mbar, and Touba Mouride). An estimated 74 tons were seen--15 tons from the Gambia and the rest apparently from the "retenue". Sellers were predominantly SV's or their agents; a few individual farmers were selling small amounts and three private traders were selling on their own behalf. Buyers were a mixture of private traders and individual farmers. The asking price per 50 kg sack ranged from 1,250 to 1,650 CFA with most cases falling in the 1,500 to 1,600 CFA range. By the beginning of August, the fertilizer was gone from all markets except Mbar.

In mid-November, researchers for this study conducted another informal survey in Kaolack. Six private traders were contacted regarding sales of fertilizer to vegetable growers. Approximately 18 tons were seen in the warehouses. One trader said he could supply 22 tons of NPK and one ton of urea; another claimed to have 20 tons of NPK and 10 tons of urea which someone in St. Louis had promised to buy but never did. The same price was quoted by all traders--2,000 CFA per 50 kg sack. Wet sacks of urea were selling for 1,800 CFA. The general impression obtained was that the fertilizer was not selling well even at the low price of 2,000 CFA per sack.

d. Distribution to members. Once transportation and sales decisions had been made, sections had to decide how to distribute the remaining fertilizer and sales revenues among members and, in some cases, among non-members who had sold peanuts at the section. The problems faced by CO.D.'s, and their different approaches to fertilizer allocation, were discussed in sections C.1.c and C.1.d above. The problem for each section receiving fertilizer was to determine on what basis their particular allotment had been calculated. The 28 SV's in the sample which served as sales points had to know whether they received fertilizer for all peanuts sold at their section or only for member's sales. If members also sold at SONAR and/or other sections, the SV had to know if the fertilizer tied to these sales was included in the section's allotment. Without knowing whose fertilizer SONAR had included in each allotment, the sections could not properly decide on an equitable system of distribution.

Once it was known whose fertilizer had been delivered to the section, an appropriate list of sales by claimant had to be developed. Frequently the

SONACOS weighers provided their sales lists and assisted in the distribution. Some sections had lists made up by the ABC's. Others had no lists but distributed to farmers upon presentation of sales receipts. There was no commitment by SONAR or SONACOS to provide sections with sales lists itemized by farmer. This occurred only where weighers had taken the time to break down their lists by section and by farmer.

An important procedural aspect of the distribution was the formula developed by sections to calculate the amount of fertilizer due each farmer per kg of peanuts sold. Tremendous variability exists in the formulas which sections claimed to have used, as well as in the quantities which farmers in any given section reported having actually received. Sections claim to have distributed anywhere from 22 to 60 kg of fertilizer per ton of peanuts sold.

Of the 47 SV's receiving fertilizer, 36 indicated that they tried to distribute a fixed amount per kg of peanut sales. For these 36 SV's, the amounts of fertilizer they claimed to distribute per ton of sales were as follows:

Table 11. Quantities of Fertilizer which Village Sections Reported Distributing per Ton of Peanut Sales, Sine-Saloum, 1984.

Kilograms of Fertilizer Per Ton of Peanuts Sold	Number of Sections
<25	1
26-35	1
36-40	3
41-45	3
46-50	12
51-55	13
>55	3
TOTAL	36

Although these sections claimed to have based distribution on a specific formula, it is not clear how effectively their plans were carried out. Many SV's seemed to have received more fertilizer than is accounted for by the reported distribution system, and a few SV's appeared to have had shortfalls. These calculations were made using peanut sales figures reported

by the SV's which, as discussed previously, may not have been an accurate reflection of fertilizer claims actually presented. In follow-up interviews with SV's, a number did admit that they had fertilizer left over after the distribution process. In many cases this fertilizer was sold and/or given as gifts to people who assisted with the distribution.

The 11 remaining SV's used a variety of methods to distribute their fertilizer. Three of the 6 sampled in Foundiougne, for example, in effect favored large producers. In one SV, the big producers presented their needs in a general assembly and received essentially what they requested until supplies ran out. It is not at all clear that this arrangement had the full approval of the smaller producers. Another section gave fertilizer only to those who had sold at least one ton of groundnuts; amounts received were somewhat influenced by amounts of peanut sales but there was no exact accounting. The third SV in this group gave only to those who sold 500 kg or more.

The Department of Kaolack had 3 SV's with unconventional distribution systems. One sold its entire allotment and distributed the cash to members at a rate of 180 CFA/100 kg of peanut sales. Another distributed according to the amount of peanuts sold but only to those having sold more than 100 kg. The most interesting one was section which decided that quantities due to each farmer were too small to be effectively used. A decision was made in a general assembly to sell the NPK on credit to any members willing to put a piece of farm equipment up as collateral and reimburse the other members by the end of January 1985 at the rate of 35 CFA/kg.

One SV in Nioro had distribution problems because the president sold about 4,000 kg of NPK and disappeared with the money. Another SV in Nioro had to change its fertilizer/peanuts sales ratio midway through the distribution process when it was informed that it was responsible for distributing fertilizer to a village which it had not previously considered a member of the section.

Given this diversity of distribution schemes, it is not surprising that the fertilizer/peanut sales ratio at the farm gate was quite variable. Table 12 shows the relationship between quantities of peanuts officially sold by 153 farmers in 1983/84 and amounts of "retenue" fertilizer received by these farmers. Lines 2 and 4 of the table refer to fertilizer which actually reached the farmer, which averaged 103 kg per farmer. Lines 3 and 5 adjust

Table 12. Average Peanut Sales, Fertilizer Received, and Fertilizer/Peanut Sales Ratios per Farmer by Department for Farmers Participating in the Retenue, Sine-Saloum, 1984.

	DEPARTMENTS a/						
	FAT	FOU	GOS	KAF	KAO	NIO	TOTAL
Average kg peanuts sold per farmer b/	1149	3789	1848	3506	709	4574	2913
Average kg fert received per farmer c/	51	141	75	148	21	119	103
Adjusted average kg fert received d/	51	141	75	150	26	168	114
Average kg fert received per ton peanut sales	44	37	41	42	30	26	36
Adjusted average kg fert received per ton of sales	44	37	41	43	37	37	39
No. of farmers	24	21	17	45	18	28	153

Source: Field surveys, 1984. A sample of 191 farmers was studied in 6 departments of the Sine-Saloum. Of this sample, 153 sold peanuts in 1983/84.

a/ Departments of Fatick, Foundiougne, Gossas, Kaffrine, Kaolack, and Nioro.

b/ Standard deviations of the Departmental averages shown in this table were consistently greater than the averages.

c/ These figures do not represent the total fertilizer distributed by SONAR to SV's. They exclude amounts of fertilizer sold by SV's who then distributed cash to their members. SV's sold fertilizer only in the departments of Kaffrine, Kaolack, and Nioro.

d/ These figures include the fertilizer equivalent of the cash received by farmers, converted at the departmental average price per kg received by SV's who sold fertilizer.

amounts in lines 2 and 4 upward to include the fertilizer equivalent of cash received from sales of fertilizer by the SV. The amount varied considerably among departments, with the Kaolack average being only 21 kg and the Kaffrine average being 148 kg. The amount received per ton of peanuts sold averaged 36 kg, ranging from 26 in Nioro to 44 in Fatick. Adjusting for cash received by farmers from SV sales, the average is higher (39 kg) and the range smaller (37 to 44 kg). These figures show clearly that there is a sizeable gap between the theoretical entitlement of 55 kg of fertilizer per ton of peanuts sold and the amount of fertilizer actually received by farmers.

One hundred fifty-three farmers in the sample were entitled to receive some "retenue" fertilizer. Of these 153, 48.4 percent used all the "retenue" fertilizer received; 14.4 percent did not use their full entitlement because the section sold a sizeable amount and gave its members cash instead; 20.9 percent received it too late to use the full amount; 4.6 percent would have used it despite the delay if there had been more rain; 4.6 percent did not receive the "retenue" fertilizer to which they were entitled and, therefore, were unable to use it; the remaining 7.2 percent reported a variety of personal reasons for not using their full allotment.

D. Fertilizer Acquisition and Use by Farmers.

Data on quantities of fertilizer acquired were analyzed for 190 of the 192 farmers interviewed. These farmers obtained a total of 21,623 kg, of which 15,837 came from the "retenue", 800 kg came from maize and cotton contracts, and 4,780 kg from cash purchases (usually of highly subsidized parallel market Gambian fertilizer). The remaining amount was obtained through gifts.

Of 192 farmers interviewed, 187 provided sufficient data on fertilizer applications and hectares cultivated for an analysis of fertilizer utilization. The 187 are divided into two groups: 145 were randomly selected and are classified as "non-sinistré" or "retenue," the remaining 42 were purposively selected and are classified as "sinistré" or "non-retenue."[1/] In this discussion of fertilizer utilization, only quantities actually received by farmers are considered; fertilizer sold by sections prior to distribution to farmers is not counted.

[1/] As discussed in section III.B.3, "non-sinistré" farmers are generally those who sold peanuts in 1983/84 and received "retenue" fertilizer, while "sinistré" farmers did not.

Farmers received three basic types of fertilizer: 8,639 kg of 6-20-10 (peanut fertilizer), 8,235 kg of 14-7-7 (millet fertilizer), and 3,696 kg of urea (intended for millet and/or maize). The remaining 1,053 kg were a mixture of the three products which farmers were unable to distinguish because they received small quantities of each type dumped into a single sack.

A detailed analysis of fertilizer use on peanut and millet/sorghum fields is presented in Tables 13 through 16. The analysis was performed separately for "retenue" and "non-retenue" farmers. The tables reveal that the 145 "retenue" farmers planted 426 hectares of peanuts, using an average of 14.8 kg of fertilizer per hectare; 99.5 percent of all fertilizer used on peanuts was the 6-20-10 variety recommended for this crop. The same set of farmers planted 608 hectares of millet/sorghum, using an average of 14.7 kg of fertilizer per hectare; 70 percent of fertilizer used was 14-7-7, 18 percent urea, 10 percent 6-20-10, and the remaining 2 percent unidentified.

Of the 42 "non-retenue" farmers, 9 managed to obtain fertilizer. The group as a whole planted 53 hectares of groundnuts using an average of 3.5 kg of fertilizer per hectare. Ninety-nine hectares of millet/sorghum were planted and received an average of 6.1 kg per hectare. Excluding farmers who did not use fertilizer, the average application per hectare is 9.9 kg for peanuts and 31.9 kg for millet/sorghum.

These results show that "non-retenue" farmers use more fertilizer on millet than on peanuts. "Retenue" farmers treat both crops equally.

Of the 57 farmers who planted maize, all were in the departments of Foundiougne and Kaffrine, and only 19 used fertilizer. Including 2 farmers who signed maize contracts with SODEVA and who received a total of 450 kg of fertilizer, an average of 113.7 kg/ha was used. If these two farmers are removed, however, the average is 28 kg per hectare.

Not all fertilizer received by individual farmers in the sample was used on crops planted this year. Due to the late distribution and the small quantities received, many farmers decided to store or sell their fertilizer. Only 1.4 percent (214 kg) of "retenue" fertilizer which actually reached farmers in the sample was sold.

The 2,801 kg of fertilizer stored by farmers represents 18 percent of "retenue" fertilizer reaching the farm gate. Farmers sampled in Kaolack, Fatick, and Gossas stored a greater percentage of fertilizer received (54,

Table 13. Fertilizer Used by "Retenue" Farmers on Peanut Crops, Sine-Saloum, 1984.[a/]

Department	No. of Cases	No. of Ha [b/]	6-20-10	14-7-7	NPK	Urea	NSP [c/]	TOTAL	Kg/Ha
Fatick	22	30	109	0	0	0	0	109	3.7
Foundiougne	18	51	313	0	0	20	0	333	6.5
Gossas	17	53	106	9	0	0	0	115	2.2
Kaffrine [d/]	44	147	3676	0	0	0	0	3676	25.7
	(43)	(122)	(1776)					(1776)	(14.6)
Kaolack	18	24	80	0	0	0	0	80	3.3
Nioro	26	121	1994	0	0	0	0	1994	16.5
TOTAL	145	426	6278	9	0	20	0	6307	14.8

Source: Field survey data, 1984.

[a/] "Retenue" farmers in this case are the 145 randomly sampled farmers who sold peanuts in 1983/84, and who therefore received fertilizer through the retenue system.

[b/] Hectares reported in Tables 13 through 16 are approximate. They are based on farmers' estimates, expressed in local measures and converted to hectares. No actual field measurements were taken.

[c/] "NSP" = "Ne sait pas," i.e., cases where the farmer could not identify the type of fertilizer.

[d/] The first row of figures for Kaffrine includes 1,900 kg purchased for cash at 38,000 CFA by a single user, to be used on 25 ha. The second row of figures (in parentheses) omits this unusual case.

Table 14. Fertilizer Used by "Retenue" Farmers on Millet/Sorghum, Sine-Saloum, 1984.[a/]

Department	No. of Cases	No. of Ha [b/]	6-20-10	14-7-7	NPK	Urea	NSP [c/]	TOTAL	Kg/Ha
Fatick	22	80	0	480	20	68	113	681	8.5
Foundiougne	18	84	290	525	0	150	0	965	11.5
Gossas	17	72	0	542	0	183	0	725	10.1
Kaffrine	44	221	191	3479	0	1142[d/]	0	4812	21.7
Kaolack	18	54	9	18	0	2	0	29	1.9
Nioro	26	97	450	1270	0	32	0	1752	18.0
TOTAL	145	608	940	6314	20	1577	113	8964	14.7

Source: Field survey data, 1984.

[a/] "Retenue" farmers in this case are the 145 randomly sampled farmers who sold peanuts in 1983/84, and who therefore received fertilizer through the retenue system.

[b/] Hectares reported in Tables 13 through 16 are approximate. They are based on farmers' estimates, expressed in local measures and converted to hectares. No actual field measurements were taken.

[c/] "NSP" = "Ne sait pas," i.e., cases where the farmer could not identify the type of fertilizer.

[d/] Includes 150 kg of urea purchased for cash by a single user.

Table 15. Fertilizer Used by "Non-Retenue" Farmers on Peanuts, Sine-Saloum, 1984.[a/]

Department	No. of Cases	No. of Users [b/]	No. of Ha [c/]	6-20-10	14-7-7	NPK	Urea	Total Kg	All Cases Kg/Ha	Users Only Kg/Ha
Fatick	7	1	11 (2)	30	0	0	0	30	2.7	15.0
Foundiougne	6	2	10 (6)	100	0	0	0	100	10.0	16.7
Gossas	6	0	7	0	0	0	0	0	0	0
Kaffrine	12	5	16 (9)	8	0	0	0	8	2.0	0.9
Kaolack	6	1	6 (2)	50	0	0	0	50	8.3	25.0
Nioro	5	0	3	0	0	0	0	0	0	0
TOTAL	42	9	53 (19)	188	0	0	0	188	3.5	9.9

Source: Field survey data, 1984.

[a/] "Non-Retenue" here refers to the 42 purposively selected farmers who were not able to sell peanuts last year, and who therefore did not receive retenue fertilizer.

[b/] "User" refers to farmers who obtained some (non-retenue) fertilizer and used it on millet and/or peanuts.

[c/] Numbers in parentheses are hectares cultivated by fertilizer users; other numbers include all hectares cultivated by "non-retenue" farmers.

Table 16. Fertilizer Used by "Non-Retenue" Farmers on Millet/Sorghum, Sine-Saloum, 1984.[a/]

Department	No. of Cases	No. of Users [b/]	No. of Ha [c/]	6-20-10	14-7-7	NPK	Urea	Total Kg	All Cases Kg/Ha	Users Only Kg/Ha
Fatick	7	1	13 (2)	0	0	0	0	0	0	0
Foundiougne	6	2	16 (6)	0	200	0	50	250	15.6	42.0
Gossas	6	0	19	0	0	0	0	0	0	0
Kaffrine	12	5	25 (8)	0	348	0	9	357	14.9	45.0
Kaolack	12	5	25 (3)	0	0	0	0	0	0	0
Nioro	5	0	11	0	0	0	0	0	0	0
TOTAL	42	9	99 (19)	0	548	0	59	607	6.1	31.9

Source: Field survey data, 1984.

[a/] "Non-Retenue" here refers to the 42 purposively selected sample of farmers who were not able to sell peanuts last year, and who therefore did not receive retenue fertilizer.

[b/] "User" refers to farmers who obtained some (non-retenue) fertilizer and used it on millet and/or peanuts.

[c/] Numbers in parentheses are hectares cultivated by fertilizer users; other numbers include all hectares cultivated by "non-retenue" farmers.

35, and 32 percent, respectively) than those in Foundiougne, Kaffrine, and Nioro (22, 7, and 4 percent, respectively). The very low fertilizer application rates for Kaolack shown in Tables 13 and 14 are explained by the high percent of fertilizer stored coupled with the fact that 37 percent of fertilizer received by Kaolack village sections was sold before distribution to farmers.

These figures on per hectare fertilizer utilization cannot be extrapolated to estimate an average for all Sine-Saloum farmers. The major problem is that there is no reliable estimate of the percent of Sine-Saloum farmers who were "non-retenue" ("sinistré") in 1983/84, which would permit proper weighting of the results for the two strata. Also, both the random and the purposive samples used in this study included a very high percent of "chefs de carré" (86 percent) whom one would hypothesize acquire and use more fertilizer than does the typical farmer. Preliminary results of a CILSS-sponsored farm level study conducted during the 1984/85 campaign in the Sine-Saloum (arrondissements of Ndofane, Djilor, Birkelane, and Gandiaye) identified only 4 of 120 farmers ("chefs d'unité de base") who used fertilizer on millet and/or peanuts this year.[1/] These results suggest a much lower overall rate of application than the already low rate reported in the present study.

Even without a good estimate of fertilizer use per cultivated hectare for the Sine-Saloum as a whole it is clear that the retenue system does not provide farmers with quantities of fertilizer anywhere near the agronomic recommendations of 150 kg/hectare. Assuming peanut yields of 1,000 kg/ha, a retenue of 5 CFA/kg of peanuts sold through official channels, and this year's effective fertilizer price of 91 CFA/kg, farmers receive only 55 kg of fertilizer per hectare of peanuts cultivated. Moreover, of the 21,623 kg used by farmers in the sample, only 15,837 came from the "retenue" with most of the rest being smuggled from the Gambia. The average price per kg for these parallel market purchases was 20 CFA.

E. **Problems and Constraints.**

In section C.2.d. it was suggested that the major problems encountered in the distribution campaign were delays and high variability in quantities of fertilizer received for a given value of "retenue". These

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[1/]Source: V. Sene, Service Etude et Plan, Inspection Régionale de la Production Agricole, Kaolack, November, 1984.

problems are due in large part to a failure by both SONAR and village sections to establish and implement a clear set of operating procedures.

At both the SONAR and SV level the most serious obstacle was the fact that records of peanut sales (1) were not always accurate, (2) not always available, and (3) did not contain the information necessary to distribute fertilizer to individual SV's and farmers. As a result (1) SONAR CO.D.'s spent inordinate amounts of time calculating allotments, (2) methods of calculation varied from department to department and from SV to SV, (3) SV's were often unable to determine whether they had received the correct allotment, (4) amounts received by individual SV's were not always related to amounts sold by SV members, and (5) amounts received by individual farmers varied considerably per ton of peanut sales.

SONAR also failed to establish procedures to assure a continuous flow of information from Dakar to regional directors, CO.D.'s, CEPA's, and secco managers. During the month of May and June, no one in the Sine-Saloum seemed to know what was happening--fertilizer was arriving at CEPA's but procedures for distribution had not been communicated. Part of this confusion seems to be related to the fertilizer financing problems encountered by the government and uncertainty about whether the Sine-Saloum would receive its full allotment.

Once distribution in the Sine-Saloum began, SONAR managed fairly well with the limited resources at its disposal. Although in some cases use of personnel and transportation resources could have been better organized, the most serious problems developed because (1) the distribution began after the expiration of secco managers' contracts and (2) SONAR's financial problems and poor record of paying transporters limited its ability to use private truckers to expedite deliveries to seccos.

SV's in the sample appear to have coped well with the new responsibilities which they were suddenly assigned. In a large number of sections most of the responsibility for getting fertilizer from SONAR to members was assumed by the President and/or bureau. The general membership was not consulted--this differs significantly from the Casamance system where separate commissions were established by each SV to deal with fertilizer distribution. A few cases of mismanagement by these individuals and dissatisfaction on the part of the general membership were encountered but in general SV's appeared satisfied with the role played by their elected officials.

Those SV's which incurred high transportation costs complained about them; however, all but one SV felt those who had negotiated transportation did the best they could under the circumstances. The variability observed in trucking and carting rates and the fact that most rates were much greater than official fertilizer hauling rates suggests that as SV's assume a larger role in input distribution greater thought must be given to means of consolidating transportation needs among neighboring SV's to benefit from economies of scale, back hauls, etc.

The greatest problem at the SV level seems to be ensuring an equitable distribution of fertilizer among members. The performance of SV's in establishing and implementing fertilizer distribution rules which reflected the intent of the retenue system--i.e., fertilizer to each according to his peanut sales--is difficult to evaluate. Results of farmer interviews suggest that fertilizer received by individual farmers did not always correspond to what SV bureaus claimed to have distributed. In addition, there were a number of clear-cut cases where small producers received no fertilizer and were not reimbursed their "retenue" by those who did receive it. (Five percent of farmers entitled to "retenue" fertilizer did not receive any.) It is also evident that farmers not selling peanuts in their own name seldom received the fertilizer for which they had paid. From an agronomic point of view, it probably would have been better for a few producers to use effective quantities of fertilizer than for many individuals to apply quantities which were too small to have an impact. On the other hand, allocation of fertilizer to the bigger producers poses serious equity problems, since the smaller farmers--who can least afford it--are then subsidizing the bigger ones.

As SV's assume greater responsibility for input distribution, it will not be possible for the government to supervise and/or control the decisions made within each section. Given the nature of village politics, the interests of small producers may therefore not always be respected. One must ask whether such abuses are more likely to occur with the "retenue" system than with some other system.

F. Attitudes and Opinions.

1. Respondents' Assessment of This Year's Distribution Campaign.

To identify elements of the distribution system which should be improved, sections and farmers were asked to identify the most troublesome

aspects of the campaign. Table 17 summarizes these results. The delay in delivery was identified as the principal problem by 71 percent of sections and 60 percent of farmers sampled. Nine percent of farmers and 8 percent of sections felt that the major problem was the government's failure to fulfill its obligations, i.e., farmers in general did not receive the quantities anticipated nor the quantities finally authorized. Most farmers anticipated 100 kg of fertilizer per ton of sales because at the time the retenue was explained to them the fertilizer price was approximately 50 CFA/kg. Most actually received less than the 55 kg finally authorized. Farmers also complained that quantities received were too small, that the price was too high, and that the system did not provide fertilizer to those who were unable to sell groundnuts last year.

The following two-part question was addressed to SONAR personnel, village sections, and farmers:

"What aspects of this year's fertilizer distribution are worth preserving and what aspects should be changed?" The responses to this question fell into eight general categories, represented by the horizontal divisions in Table 18. The column totals do not add up to 100 percent. Farmers gave a great variety of responses to this question; consequently, each answer was made by a small percent of the total number of respondents. Responses which were made by less than four percent of the respondents are not show.

The first line of the table shows the frustration of farmers and village sections; 30 percent of farmers and 27 percent of SV's felt that no aspect of this year's system was worth retaining. However, this was not matched by similar percent of respondents who said "everything should be changed." In general, respondents had much more specific ideas about what aspects of the system to change than about aspects to maintain. Line 3 of the table shows the overriding importance of delivery delays to all three categories of respondents. Line 4 shows that 33 percent of SV's and 26 percent of farmers believed that prices should be lowered.

Comments on the role of SONAR in future distribution programs show an obvious respondent bias on the part of SONAR employees, 35 percent of whom felt that only SONAR had the necessary personnel and resources to distribute fertilizer. Some respondents in each category stated that farmers and village sections had to travel too far to collect their fertilizer this year (line 6). Line 7 shows that 30 percent of SV's and 19 percent of farmers

Table 17. Opinions on the Principal Problems with the Distribution Campaign, Sine-Saloum, 1984.

Category of Problem	Percent of SV's [a] Citing as Principal Problem	Percent of Farmers Citing as Principal Problem
Delays in delivery	71	60
Government failed to respect its obligations	8	9
Quantities too small to be used effectively	8	7
Fertilizer price too high	6	6
Retenue system discriminates against "sinistré" [b]	--	6
Other	7	22

Source: Field survey data, 1984. Responses to the question: What was the most troublesome problem with this year's distribution system?

[a] SV = "section villageoise," or village section.

[b] "Sinistré" refers to farmers who, because of crop failure, were unable to sell peanuts in 1983/84, and who were therefore not eligible for retenue fertilizer.

Table 18. Attitudes Toward Different Aspects of the Retenue System, Sine-Saloum, 1984.

Responses to the Question: What aspects of this year's distribution System would you like to see maintained				Responses to the Question: What aspects of this year's distribution system should be changed			
Comment	SONAR	Section	Farmer	Comment	SONAR	Section	Farmer
Nothing	8	27	30	Everything	--	--	--
No idea	35	13	13	No idea	--	4	--
-None-				Timing of distribution	75	52	57
Price would be OK if other aspects of system respected	--	4	4	Price must be lowered	8	33	26
Only SONAR has resources needed to do job	35	--	--	SONAR should be eliminated from distri. process	--	10	4
-None-				Distances traveled by SV and/or farmers were too long	8	15	7
Role of SV should be continued and expanded	4	30	19	SV's need more training before assuming job	12	--	--
Retenue should be maintained	43	17	22	Retenue should be abolished or seriously revised	33	27	35

Source: Field survey data, 1984.

felt it was important to expand the role of SV's in the fertilizer distribution process. SONAR employees were less enthusiastic about this option, with 12 percent stating that SV's needed more training before they could correctly fulfill these functions.

2. Attitudes towards the "Retenue" System.

Table 18 shows that respondents were ambivalent about the "retenue" as a system of fertilizer distribution. However, opinions vary between categories of respondents as well as within each category. A larger percent of farmers and SV's opposed retaining the retenue system while a larger percent of SONAR employees favored continuing it (line 8). The difference between the percent for and against is not very large, however; note that 23 percent of SONAR employees, 43 percent of farmers, and 56 percent of SV's made no comment on the future of the "retenue." Given the importance of opinions on the "retenue" system, the next few paragraphs elaborate on the types of comments received.

Of those SONAR employees responding to the questionnaire, 42 percent think that the "retenue" system is good and represents the only way for the majority of the farmers to obtain fertilizer. For 35 percent of these same respondents the retenue system should be abolished or at least seriously revamped. Only 17 percent of the sections are entirely favorable to the retenue system; an additional 6 percent see it as good insofar as it gives all farmers some access to fertilizer. Twenty-seven percent are strongly against it and an additional 8 percent think that the arbitrary top-down decision making process used to implement the "retenue" system must be changed.

Between the two extreme views about the "retenue" expressed by farmers (22 percent for and 35 percent against), there are a number of intermediate attitudes. For instance, 8 percent of the farmers interviewed felt that the simple fact of securing a certain quantity of fertilizer for the majority of farmers is a positive move after several years when the only fertilizer available was through a limited network of cash sale stores. Four percent think that the system would be more acceptable if certain norms were respected, evidently with regard to prices and timing of deliveries. Only 14 percent of farmers considered a higher "retenue" a viable solution to the problem of inadequate quantities. Farmers who were not entitled to "retenue" fertilizer because they did not sell groundnuts the previous year felt that the system reinforced their misfortune, which was due to completely

uncontrollable natural factors. In summary, the particular circumstances of this year's campaign (delay, unexpected price changes, and the obligatory nature of the "retenue") contributed to negative attitudes and opinions about the "retenue" system.

Follow-up interviews were conducted with 41 of the 48 SV's. During these interviews, SV leaders were asked what they thought they could do in the future to avoid the recurrence of problems associated with the retenue system, such as those pertaining to organization and record keeping during the peanut marketing process. Thirty-five percent of the respondents said that it is not their responsibility to solve problems they did not create. For them, the solutions have to come from the top where the problems originated.

Eighteen percent of SV leaders believed that they needed better information and training to be able to carry out the required adjustments. They emphasized that they did not even know what the role of the section was supposed to be and what was expected of them.

Another eighteen percent plan to keep systematic records of peanut sales so that the census problem will not occur again. For example, those responsible for one sales point covering several sections have planned that each section will have a separate register and will be assigned specific days for its members to sell their peanuts.

An additional eighteen percent felt that they did not have any serious problems at the SV level so no corrective action was necessary. Six percent felt the need to improve their record system but did not have a clear idea of what they should do. Another six percent said that they would not be able to improve the situation until their section had its own sales point.

3. Opinions about Alternative Input Distribution Systems.

All three categories of survey respondents were asked the following question:

"If in the future SONAR was no longer given the responsibility for fertilizer distribution, who, in your opinion, could best perform these activities in your area?"

During the first week of the survey, farmers and sections consistently replied that the village section was the most appropriate organization to handle fertilizer distribution. Since this response appeared to reflect an inadequate understanding of the magnitude of the task performed by SONAR, interviewers were instructed to clarify the question by explaining that

fertilizer distribution involved many steps not performed by the village sections this year--e.g., doing a census of needs, placing orders with the manufacturer in Dakar, arranging for payment and transportation, etc. Multiple responses were encouraged to find out what other organizations were considered capable of assisting the sections with input distribution activities. The farmer and section responses to this question, even after the interviewers' efforts to explain the full implications of removing SONAR from the process, strongly favored increased participation of the sections. Thirty-five percent of SV's and 34 percent of farmers chose the village section; 17 percent of SV's and 12 percent of farmers chose the cooperative; 17 percent of SV's and 12 percent of farmers selected SONACOS, 17 percent of each group favored a combination of the village section working with SONACOS and/or one of the rural development agencies.

Given the expectation of the government and of donor agencies that Rural Community cooperatives and the private sector play a larger role in input distribution, attitudes about each of these alternatives were elicited with the following questions:

"Do you see a role for private traders in the distribution of fertilizer in the future?"

"Do you see a role for the Rural Community cooperatives in the distribution of fertilizer in the future?"

Tables 19 and 20 present the responses to these questions. Respondents were also asked to explain why they were for or against participation by the cooperatives and/or private traders. Of those who were against giving the responsibility to cooperatives, 31 percent of SONAR personnel felt that the cooperatives lacked the resources necessary to perform the function; 10 percent of sections and 13 percent of farmers believed that intervention of the cooperatives would generate more problems than it would solve for the majority of farmers (e.g., favoritism towards large producers, disadvantages for villages far from the seat of the Rural Community, manipulation of the distribution process by influential individuals). Seven percent of farmers felt that there were more appropriate institutions to handle the task.

Among those in favor of expanding the role of cooperatives, 38 percent of sections believed this could only be accomplished by the cooperatives in collaboration with sections and other rural development agencies. The reason for the high percentage of "no idea" responses is the recent creation of the cooperatives and the fact that they have yet to assume any responsibility.

Table 19. Attitudes Toward an Expanded Role for Rural Community Cooperatives, Sine-Saloum, 1984.

Respondent	For	Against	No Idea	Ambivalent
	(Percent)			
SONAR personnel	28	36	36	--
Village sections	48	21	31	--
Farmers	34	21	41	4

Source: Field survey data, 1984.

Table 20. Attitudes Toward an Expanded Role for Private Traders, Sine-Saloum, 1984.

Respondent	For	Against	No Idea
	(Percent)		
SONAR personnel	8	72	20
Village sections	6	81	13
Farmers	7	62	31

Source: Field survey data, 1984.

Of those against the involvement of private traders, most cited fears that the price would be too high (46 percent of SONAR personnel, 31 percent of sections, 32 percent of farmers). Others felt the distribution network would not reach all farmers (19 percent of SONAR personnel, 10 percent of sections and 2 percent of farmers). Thirty-two percent of farmers simply stated that they lacked confidence in private traders because they do not understand farmers' problems and pursue only their own interest. Twelve percent of SONAR personnel believed that demand for fertilizer would not be sufficient to encourage participation by the private sector.

The expressed attitudes and opinions about the fertilizer distribution system are closely related to particular circumstances that prevailed this year. The "retenue" system as implemented for the first time did not satisfy the intended beneciaries, most of whom felt that they had lost rather than gained. The disappointment was general, due to the unusual delay coupled with the unmet expectations of farmers who felt that the basic obligations assumed by the government were not met. The disappointment of farmers was further compounded by a generally poor understanding of the system. Thirty-four percent of those having sold peanuts last year did not know that the fertilizer "retenue" was 5 CFA per kg. Sixty-five percent of 144 responding to a question about the price of fertilizer (or fertilizer/peanut sales ratio) upon which actual distribution was based had no idea, and another 15 percent had incorrect ideas. Lastly, the "retenue" was originally designed to be supplemented by other sources of fertilizer (cash sales and purchases on credit), but the credit system does not yet exist and cash sales were only available to those farmers having access to Gambian fertilizers smuggled across the border.

On the other hand, farmers are generally favorable to the intervention of the village sections in the distribution process. However, whether they can accept responsibility for a broader part of the distribution activities, and what type of assistance they would need are questions which the sections, in collaboration with the cooperative service, must address.

4. Farmers' Attitudes Toward Cash Sales of Fertilizer.

The issue of effective demand for fertilizer requires much more in-depth study than was possible in a single-interview survey of farmers. Nevertheless, three questions were asked of all farmers in the Sine-Saloum survey in an attempt to understand their purchasing behavior vis à vis cash sales of fertilizer:

(1) "What quantity of fertilizer did you purchase for the 1983/84 campaign when SODEVA sold it for cash at 45 CFA per kg?"

(2) "Why didn't you buy more?"

(3) "If fertilizer had been available for cash purchase at 45 CFA per kg when you sold your peanuts from the 1983/84 campaign, how many kg would you have purchased?"

If the reply to question (1) above was not the same as that to question (3), farmers were asked to explain why there was a difference. If the amounts were the same both years, farmers were asked whether they would always try to use the same quantity. These latter two questions were posed in an attempt to encourage farmers to give reasonable estimates of purchasing power in the hypothetical (third) question rather than the quantity they would have liked to purchase had they had the financial means, as well as to seek explanations for apparently inconsistent responses.

The center part of Figure 9 shows the percent of respondents falling into the four possible purchasing categories. The upper right corner presents more detailed information on reasons why the 81 farmers who said they would have bought at the end of the 1983/84 campaign did not buy the previous year. The fact that 29 claimed their financial situation improved during the 1983/84 campaign needs to be verified given that this harvest was generally poorer than that in 1982/83. The reasons for non-purchase in both cases are summarized in the lower right corner. Lack of financial means is the most frequently cited category for both years. Lack of availability and high price were also important determinants.

The "fertilizer not available" category used in the two corner tables reflects two aspects of non-availability--20 farmers claimed that it was truly unavailable in their area while 29 stated that they were not informed of its availability until it was too late to purchase it. These results highlight two important ingredients in a cash sale program which appear to have been lacking when SODEVA sold fertilizer: accessibility to farmers, and publicity.

Figure 9. Farmers' Explanations of Fertilizer Purchases from SODEVA (1982/83) and Hypothetical Purchases (1983/84), Sine-Saloum, 1984.

Reasons for Non-Purchase From SODEVA	No. of Cases	Percent
Lacked financial means	29	35.8
Not informed of fertilizer availability in time	29	35.8
Fertilizer not available	20	25.7
Other	3	3.7
TOTAL	81	100.0

Would Have Bought 83/84 \ Bought From SODEVA	Yes	No
Yes	6% (11)	42% (81)
No	1% (2)	51% (97)

(Number of cases in parentheses)

Would Not have Bought 83/84 Because \ Did not buy From SODEVA because	45 CFA Price Too high	Lacked Financial Means	Fertilizer Not Available	Other
45 CFA price too high	15% (15)	3% (3)	7% (7)	
Lacked financial means	0 (0)	51% (49)	20% (19)	2% (2)*
Other	0 (0)	0 (0)	0 (0)	2% (2)

*These 2 farmers had fertilizer in storage, and therefore did not buy in 1982/83.

Source: Field survey data, 1984.

VII. SURVEY RESULTS--FLEUVE REGION

A. Structure, Participants, and Procedures.

1. Structure and participants.

The regional development organization in the Fleuve region, SAED, controls fertilizer distribution to irrigated perimeters. The structure of fertilizer distribution varies somewhat as a function of differences in perimeter management (discussed below). SAED deals mainly with farmer groups (GP's), whose composition varies. GP's in Delta are rather small (average of 24 members) and were formerly grouped into cooperatives. This year, the cooperatives were dissolved and replaced by village groups (sections villageoises, SV) which may cover more than one village. The large perimeters of the Delta are subdivided into several zones each having one or more SV's. Podor and Matam departments each have one SAED delegation and several zones that serve a large number of irrigated village perimeters (PIV's). Each PIV is operated by one GP usually composed of about 100 members (average of 93 in survey sample). The PIV's are independent of the SV's, which either do not exist, or exist in name but are not operational. The SV's do not play an important role in the fertilizer distribution system. With the exception of the SV of Ndombo-Thiago in the Delta, they do not intervene in demand formulation, distribution, or accounting procedures. Data collected at the SV level were not analyzed for the above reasons.

Fertilizers arrive and are stored at the SAED perimeter base from where they are distributed to the zones. SAED tractors and trucks transport fertilizer from the central storage to the zones free of charge. Most zones have an enclosed SAED storage facility, or sometimes a GP- or SV-managed warehouse. Unloading and loading of fertilizers at SAED warehouses is provided free by SAED. Table 21 indicates the available storage facilities and drop points for the area surveyed. Incoming and outgoing shipments are registered by the warehouse manager (intendant). The GP's receive their fertilizer at the zone level and, depending on distance, degree of autonomy, and availability of transport, may arrange their own transport from the zone to their village. The head of the GP and the intendant both sign a letter of delivery which is then used for bookkeeping purposes.

These procedures vary somewhat (see Table 21). Where storage facilities exist at the GP or SV level, the president of the SV also signs the letter of delivery. Access to the storage facility is controlled by himself and a SAED

Table 21. Storage Facilities and Distribution Points in the Survey Area, Fleuve Region, 1984.

	DELTA				MIDDLE VALLEY	
	Lampsar	Boundoum	Colonat	Ndombo-Thiago	Podor	Matam
(1) Central storage	2	1	1	--	2	1
(2) SAED zone storage	--	3	--	2	6	5
(3) SV/GP storage	7	2	--	12	--	--
(4) Village dist. point	--	--	at GP	--	GP(64)	GP(73)
No. GP's surveyed	6	6	4	4	8	9
Reception at (1)	6	3	--	--	--	--
Reception at (2)	--	3	--	--	3	--
Reception at (3)	--	--	--	4	--	--
Reception at (4)	--	--	4	--	5	9

Source: Field surveys, 1984.

employee. At Ndombo-Thiago, where farmers have their own tractors, they must collect their GP's fertilizer themselves. At other places where SAED does not transport fertilizer beyond the zone level, farmers use their own transport to collect the fertilizer, signing a letter of delivery in the presence of the head of their GP. Figure 10 presents a diagram of the SAED fertilizer distribution system and illustrates certain differences in procedure.

The personnel requirements for the distribution are rather low and discontinuous. The storage manager recruits occasional laborers for unloading arriving trucks (if not done by the transporter), and loading fertilizer to be transported to different zones. The prevailing wage rate is 300 CFA/ton/operation. Total cost figures are not available since part of the fertilizer is unloaded by truckers, and reloading is partly done by SAED employees or farmers. SAED always pays for loading and unloading, no matter who does it. SAED storage facilities do not have permanent employees except the manager and, in some instances, an assistant.

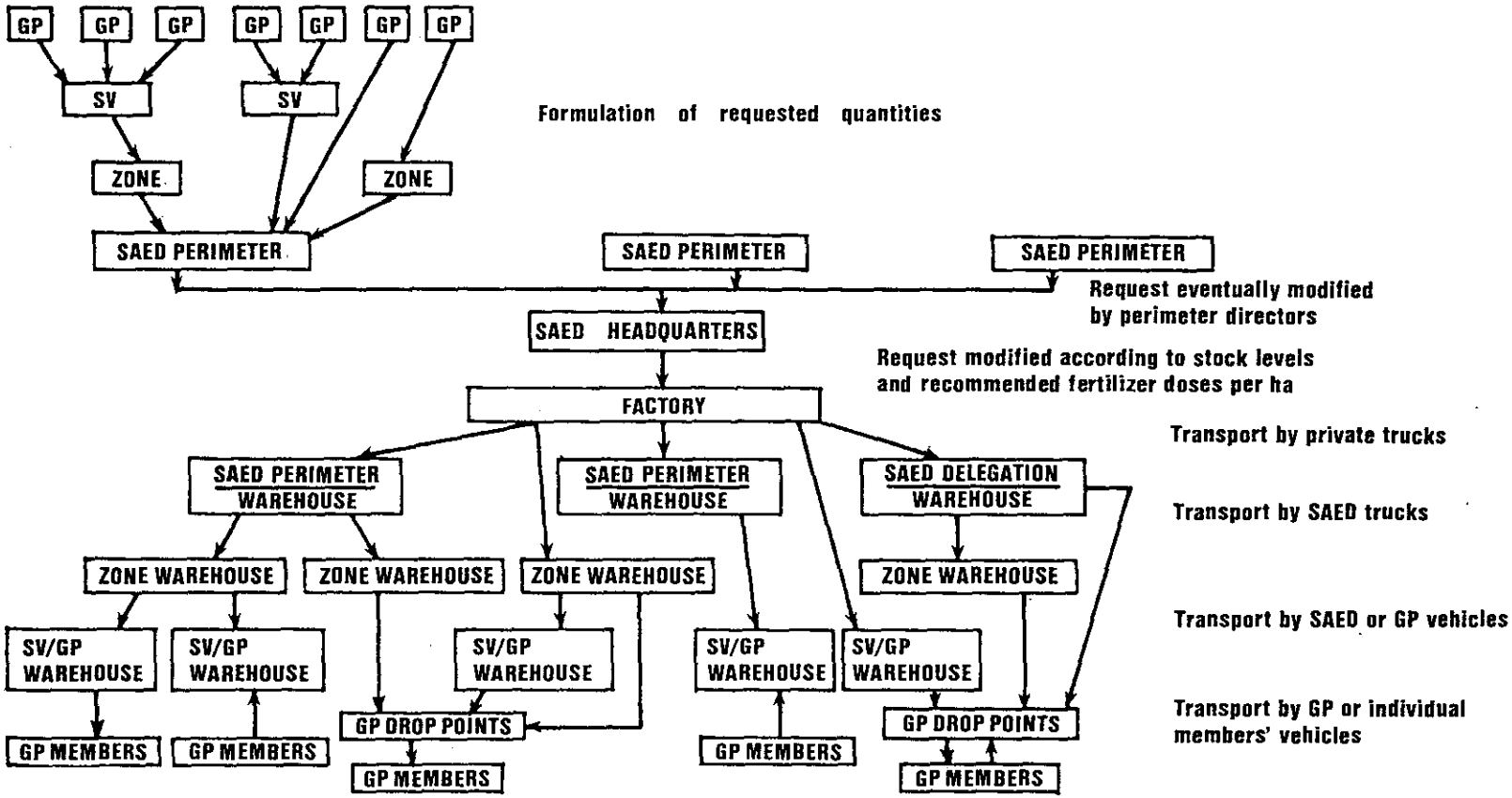
2. Operational procedures.

In the past, perimeter directors determined the quantity of each type of fertilizer to be ordered by multiplying the perimeter area by the recommended dose per hectare and adding 5-10 percent for contingencies. In Podor and Matam departments, sometimes the zonal authority formulated his demand for the PIV's under his control, but more often the central base or delegation director actually established the requested quantities. Recommended fertilizer levels have been determined by the SAED division of agricultural production and have been adjusted by the individual perimeter directors. Quantities to be delivered to individual farmers were calculated by multiplying the farmer's irrigated area by the recommended dose and rounding to the nearest bag.

This year, however, given the unfavorable reaction of farmers to the significant fertilizer price increases, SAED decided to let farmers formulate their own demands. The farmer groups usually discussed how much fertilizer to take, and the sum of the individual demands, or the GP's cultivated area multiplied by the agreed-upon dose, was passed on to SAED.

To facilitate reimbursement at harvesting time, records are kept of fertilizer quantities delivered at the GP and individual level. SAED provides inputs and services as an interest-free credit to be repaid at

Figure 10. Organization of the SAED Fertilizer Distribution System, 1984.



Source: Field surveys, 1984.

harvest. GP's who do not reimburse their debts may be denied credit the next season. As part of SAED's decentralization policy ("responsibilisation des paysans"), the GP's are responsible for reimbursing the total amounts due from its members, with group solidarity relied on to pressure individuals to repay.

Requests from perimeters and departments are centralized by the SAED HQ and forwarded to fertilizer manufacturers in Dakar. Fertilizers are transported by private truckers at a fixed cost per ton per mile. The SAED Directorate General calculates an estimated total fertilizer requirement for each perimeter or delegation. These estimates are adjusted according to prevailing stock levels and the anticipated movements of excess stocks. Subsequently, transport costs are calculated by multiplying the fixed cost per ton per kilometer by the required fertilizer quantity for each destination. The average transport cost per ton is then calculated and added as a flat rate to the cost price for each type of fertilizer throughout the SAED controlled area. This means in effect that transport to remote areas is subsidized while transport to the Delta perimeters is surcharged. (See Annex Tables 14 and 15 for details.) Subject to transporter agreement, trucks are sent directly to central storage facilities at the perimeter (Delta) or zone (Podor and Matam). Once distribution is complete, perimeters and departments communicate their existing stock levels to SAED HQ, which enables reallocation of fertilizer to other areas if need be. SAED HQ also ensures that fertilizers are delivered first to areas that become less accessible after the first rains (especially Matam department and part of Podor (Ile à Morphile)).

Within the SAED framework, there are several ways of communicating to farmers or their representatives information about input availability or timing of input distribution. There is a continuous process of consultation between SAED and farmer representatives with regard to the dates of irrigation, distribution of seeds, and planting and sowing. Often one day a week is reserved for discussions between farmers and SAED officials. Farmers also learn of the arrival and availability of fertilizers at the SAED level through visits to the SAED base, or from information passed on by other farmers, extension agents, zone directors, etc. Overall, the head of the GP is the person who announces the exact date when fertilizer can be obtained or will be delivered to his GP members. (See Table 22.) Farmer group

Table 22. Sources of Information on Fertilizer Distribution Start Dates, Fleuve Region, 1984.

Source of Information	Delta No.	Delta Percent	Middle Valley No.	Middle Valley Percent	Total Sample No.	Total Sample Percent
Farmers' Sources of Information						
GP President	60	78	57	84	117	81
Zone Chief	2	3	11	16	13	9
SV President	4	5	--	--	4	3
Other	11	14	--	--	11	7
TOTAL	77	100	68	100	145	100
GP Presidents' Sources of Information						
SAED Zone Chief	7	35	6	35	13	35
SAED Warehouse Mgr.	6	30	7	41	13	35
SAED Extension Workers	5	25	3	18	8	22
Perimeter Director	1	5	1	6	2	5
No information	1	5	--	--	1	3
TOTAL	20	100	17	100	37	100

Source: Field surveys at perimeter, farmer, and farmer group level, 1984.

presidents have regular contact with SAED officials, who usually provide information on the exact date of delivery or the date at which fertilizer can be obtained at the SAED warehouses.

This year's increased price levels were usually communicated by the perimeter directors to the SV and GP presidents after meetings at the SAED base. Presidents were asked to pass the information on to their members. When analyzing the dates of price announcements, it is clear that prices were announced by GP presidents to their members according to the start of the agricultural season and that this information was held back unnecessarily in some places. The frequency distribution of announcement dates is presented in Table 23.

As mentioned above, farmers could formulate their individual fertilizer demands, rounded to the nearest bag (50 kg). Where area cultivated per farmer is small (PIV's), farmers sometimes decided to share bags (two or three farmers per bag, divided with or without weighing), or to make one request for the entire year's fertilizer (in case of double-cropping), enabling them to store part of a bag for the dry season crop. At the SAED level, quantities inferior to one bag were not distributed, which facilitated both distribution and bookkeeping procedures. The GP presidents received the entire quantity for their group and were responsible for its distribution to individual farmers. Because of high price levels, some GP's (e.g., in Lampsar) disagreed on how much fertilizer to take, and farmers had to obtain their fertilizer individually at the SAED warehouse. (See Figure 10 and Annex Table 17.) This also applied to members of GP's who did not have access to credit and had to pay cash. (Three out of 17 GP's surveyed in Matam department were denied credit because of non-reimbursement of prior debts.)

B. The Distribution Campaign.

SAED HQ released a document in May indicating the quantities of fertilizer to be distributed to each perimeter and delegation, and the anticipated dates of distribution (Table 24). Quantities were based on last year's fertilizer utilization figures and were calculated before the new prices were known. The SAED perimeter or delegation directors independently formulated their requests, based on their perimeter fertilizer recommendation and anticipated cultivated area (Table 25). The requested quantities are higher than SAED HQ figures in 3 out of 5 cases for urea. Discrepancies also occurred between fertilizer stock levels communicated by perimeter directors

Table 23. Timing of New Fertilizer Price Announcements to Farmers, by Month, Fleuve Region, 1984.

	D E L T A		MIDDLE VALLEY		TOTAL SAMPLE	
Month (1984)	No.	Percent	No.	Percent	No.	Percent
Announcements to GP Presidents						
April	--	--	1	6.2	1	2.9
May	5	27.8	6	37.5	11	32.4
June	5	27.8	6	37.5	11	32.4
July	3	16.6	1	6.2	4	11.7
August	5	27.8	2	12.5	7	20.6
TOTAL	18	100.0	16	99.9	34	100.0
Announcements to Farmers						
April	-	-	7	10	7	5
May	15	20	18	26	33	23
June	17	22	25	37	42	29
July	20	26	8	12	28	19
August	16	21	8	12	24	16
Other	2	3	1	1.5	3	2
No info.	7	8	1	1.5	8	6
TOTAL	77	100	68	100	145	100

Source: Field surveys, 1984.

Table 24. SAED Plan for Fertilizer Distribution by Perimeter for the 1984 Wet Season, Fleuve Region.

	DELTA				MIDDLE VALLEY	
	LAMPSAR	BOUNDOUM	COLONAT	NDOMBO	PODOR	MATAM
UREA						
Qty needed[a]	318	365	345	107	440	430
Stocks after CS[b]	-	-	49	126	154	314
Anticipated delivery	318	365	296	-	286	116
Anticipated date[c]	06/30	06/30	06/30	06/30	04/30	04/30
NPK						
Qty needed	212	243	230	80	330	323
Stocks after CS	-	-	103	27	191	143
Anticipated delivery	212	243	127	54	140	180
Anticipated date	04/30	04/30	04/30	04/30	04/30	04/30

Source: "Evaluation des quantités d'engrais nécessaires pour la campagne 1984/85." SAED, URIC, May, 1984.

[a] SAED HQ figures in above table are based on perimeter area x recommended fertilizer dose. These recommendations at the HQ level do not correspond to the individual perimeter recommendations, which explains the lack of correspondence between needed (HQ) and requested (perimeter) quantities (see table 5). Discrepancies in the stock figures may result partly from HQ figures being estimates of stocks after the CS (March-May 1984) whereas fertilizer doses and cultivated area by perimeter in the CS are still unknown at time of publication of cited document.

[b] CS = Contre saison or dry season.

[c] Date = month/day; 06/30 = June 30.

Table 25. Fertilizer Quantities Requested and Received by Perimeter and Delegation Directors, and Initial Stocks, Fleuve Region, 1984.

	DELTA				MIDDLE VALLEY	
	LAMPSAR	BOUNDOUM	COLONAT	NDOMBO-THIAGO	PODOR	MATAM
UREA Requested	418	440	NA	97	117[a]	628
Received[b]	200	435	NA	60	250	156
Difference	-218	-5	NA	-37	+133	-472
NPK Requested	200	278	300	38	28[a]	388
Received[c]	100	140	140	40	32	157
Difference	-100	-138	-160	+ 2	+ 4	-231
UREA stocks[d] (tons)	-	10	43	129	130	105
NPK stocks	_	10	135	70	113	216

Source: Perimeter-level survey data, 1984.

[a] Fertilizer requests are timed in relation to the agricultural calendar at Podor; the figures indicated represent only part of the total demand for the 1984 rainy season.

[b] Quantities received as of September 22, 1984.

[c] No further NPK arrivals expected at any perimeter after September 22.

[d] Stock levels as of the start of the agricultural season.

and those estimated by SAED HQ. The delivery dates to the various locations were based on the expected start dates of the irrigated rice season, varying from late April to mid-July (Table 26). If the initial rains reduced accessibility, it was planned to ship available stocks in the Delta as well as the first new deliveries to Podor and Matam departments.

The distribution campaign was affected by two major factors: (a) the large price increases imposed by the government (SAED prices rose from 45 to 91 CFA/kg for urea, and from 56 to 149 CFA/kg for 18-46-0 (NPK)), and (b) SAED's unexpected inability to obtain bank credit for fertilizer purchase. With early rains at Matam, SAED was confronted with an immediate need for fertilizer deliveries to Matam, but insufficient cash. Available stocks were therefore shipped to Matam on 25 June and to the Ile à Morphile (Podor department) on 1 June. This made farmers in the Delta doubly resentful, first in response to the price increases, and then in response to the loss of local stocks of fertilizer that they had hoped would be made available at last year's prices. Some farmers called for a boycott on fertilizer; others demanded that SAED reduce the prices. In some areas, farmers attempted to renegotiate the price before submitting their fertilizer order at the GP level. This led to protracted discussions (e.g., in Lampsar), and the resulting delays in eventual delivery of fertilizer were sometimes more important than the delays resulting from SAED's cash shortage.

In the Delta, fertilizer was delivered to SAED warehouses between 5 and 13 August, about 3-7 weeks later than expected. (See Table 26.)

As of mid-October, total amounts distributed by SAED could not be obtained since urea distribution was not finished at any perimeter and NPK distribution was finished only at Ndombo-Thiago. At the time of the survey at the GP level, less than half the GP's had received their requested fertilizer quantities. At Podor and Matam over 50 percent of the GP's had received the requested amounts of urea and NPK whereas in the Delta only 25 percent of the GP's had received the requested amounts of urea and none had received NPK (Annex Table 18). In general, fertilizer was distributed later than last year, but, apart from NPK, arrived in time given this year's rainfall pattern. Distribution began the same day as delivery (25 June) in Matam; in Podor, it also began on 25 June, 3 weeks after delivery. In the Delta, distribution began between 15 and 25 August, except for Ndombo-Thiago where existing stocks were used to begin distribution on 5 July. Delays were

Table 26. Expected and Actual Fertilizer Delivery and Distribution Dates by Perimeter and Delegation, Fleuve, 1984.

	DELTA				MIDDLE VALLEY	
	LAMPSAR	BOUNDOUM	COLONAT	NDOMBO	PODOR	MATAM
	(Month/day)					
DELIVERY						
UREA expected	06/25	07/15	NA	06/15	05/15	04/25
actual	08/13	08/10	NA	08/05	06/01	06/25
NPK expected	06/25	07/15	NA	06/15	05/15	04/25
actual	08/01	08/10	NA	08/05	06/01	06/25
DISTRIBUTION						
expected	NA	08/01	NA	NA	05/15	04/25
actual	08/20a/	08/15	08/25a/	07/05b/	06/25a/	06/25

Source: 1984 perimeter and farm level survey data.

a/ Delayed due to discussion of new prices before distribution.

b/ Distribution of available stocks.

due to farmer discussion with SAED concerning the new prices, as illustrated for Lampsar perimeter in Annex Table 16.

Fertilizer quality was relatively good throughout the region. In Matam, some fertilizer had to be transported to the GP's by boat, and arrived in wet condition. Farmers refused the wet bags and SAED replaced them some days later. At the perimeter level, SAED officials complained about the poor sealing of urea bags. They estimated that 4-10 percent of the bags tore open during unloading and storage. No estimate of total losses could be obtained, but it appears that most fertilizer was reconditioned and hence recovered. The cost of these losses is supported by the perimeter. NPK bags caused no problems.

C. Problems and Constraints.

At the farmer level, high prices were the most frequently cited problem in the fertilizer system, followed in decreasing order of importance by "no problems," delays in delivery (mainly of NPK), and lack of cash purchase possibilities. A summary of problems cited by farmers and GP presidents is given in Table 27. The low level of complaints except regarding the new prices is also confirmed by the high percentage of farmers who reported satisfaction with the current system (see subsection E on opinions). Other complaints concerned strictly local conditions often specific to this year's distribution. High prices were more often quoted as the major problem at the GP level than at the farm level. In the Middle Valley the prices were the overriding concern for all GP presidents. Delays in delivery (mostly of 18-46-0) and insufficient quantities were the next most important problems encountered.

Few suggestions were advanced by farmers on perceived problems that should be solved by SAED. In general, farmers regretted the lack of concertation between themselves and SAED, probably an implicit complaint about price increases. Some GP's indicated a preference for storage facilities in their villages to ensure the availability of fertilizer when needed. Other GP's would like to be given the possibility of obtaining additional fertilizer after the distribution has terminated.

At the SAED perimeter level, there were complaints about poor sealing of urea bags. The delays and insufficient quantities received are attributed to SAED HQ. An anticipated future problem is possible delays in formulation of GP fertilizer demands if farmers are allowed to choose their own fertilizer

Table 27. Primary and Secondary Problems Cited by Farmers and Farmer Group Presidents, Fleuve, 1984.

	D E L T A		MIDDLE VALLEY		TOTAL SAMPLE	
	Nbr.	Percent	Nbr.	Percent	Nbr.	Percent
PRIMARY PROBLEM						
Cited by Farmers						
Prices too high	34	44	61	90	95	66
No problem	16	21	3	4	19	13
Delays	14	18	2	3	16	11
Other	13	17	2	3	15	10
Cited by GP Presidents						
Prices too high	11	55	17	100	28	76
Insuffic. Qty.	4	20	--	--	4	11
Delay in Deliv.	3	15	--	--	3	8
No problem	2	10	--	--	2	5
SECONDARY PROBLEM						
Cited by Farmers						
No problems	50	65	18	26	68	47
No cash sales	--	--	22	32	22	15
Delays	15	20	18	26	33	23
Other	12	15	10	16	22	15
Cited by GP Presidents						
No problems	9	45	6	35	15	41
Delay in deliv.	7	35	5	29	12	32
No cash sales	--	--	3	18	3	8
Other	4	20	3	18	7	19

Source: 1984 farm and farmer group survey data.

levels, since total perimeter/delegation requirements must be communicated at least six months before the start of the agricultural season. A particular problem occurred at Lampsar where in the past trucks delivered the fertilizers directly to village storage facilities, which gave rise to farmer complaints because of torn bags and accounting discrepancies between SAED and GP documents. In response, it was decided this year to centralize storage of fertilizers at the SAED perimeter. However, since there is no enclosed storage at the Lampsar perimeter, this only shifted the problem.

It was also evident that a lack of objective information and communication persists at the farmer level. Many farmers expressed their dislike of SAED because they believed the price increases were decided by SAED and not by the government. Similarly, some farmers were in favor of direct transport to the villages without trans-shipment at the SAED warehouse, in order to reduce transport and handling costs. However, information obtained at both the SAED and SV/GP level confirmed that no local transport or handling charges are passed on to farmers.

D. Fertilizer Use by Farmers.

Two fertilizer types are widely used in the Fleuve: urea and NPK (18-46-0). NPK is applied at the start of the season after land preparation when fields are irrigated, and hence prior to sowing and transplanting. Urea is most often applied twice, first at 35-50 days after planting and second at 60-75 days after planting.

Cultural practices and cropping sequences vary significantly in the Fleuve region. In the Delta, most farmers grow only one crop a year--irrigated rice in the rainy season. Double cropping has been recently introduced, but some GP's have experienced problems (low yields, low night temperatures, insects, etc.). A few fields are used for tomato cultivation in the cold dry season. At Podor and Matam, double cropping is common; the emphasis shifts from rice to maize further upstream, e.g., rice-rice to rice-maize in Matam department and moving to maize-maize in the Upper Valley. Cultivated areas by perimeter/delegation are presented in Table 28.

Other important differences between the Delta and Podor and Matam are in terms of size of perimeter, number of farms per GP, and average cultivated area per farmer. Most PIV's in Podor and Matam departments are between 15 and 60 ha, and GP's usually have between 70 and 100 members. The PIV area is subdivided into plots of equal size; each GP member has one plot, but may

Table 28. Cultivated Areas by Crop and by Perimeter/Delegation, Fleuve, 1983/1984.

CROP	SEASON	DELTA				MIDDLE VALLEY	
		LAMPSAR	BOUNDOUM	COLONAT	NDOMBO-THIAGO	PODOR	MATAM
		(Hectares)					
Rice	Wet	2,128	2,401	2,061	372	1,078	1,836
	Dry cold	100	135	--	--	415	--
Maize	Wet	--	--	--	--	--	293
	Dry cold	--	--	--	--	500	1,365
Tomato	Dry cold	--	--	20	203	12	19
Sorghum	Wet	--	--	--	--	--	205

Source: 1984 perimeter level survey.

cultivate several. The Delta perimeters are much larger, GP's are smaller (between 6 and 53 members), and plot sizes vary considerably within each GP. Annex Table 19 gives the frequency distribution of cultivated irrigated area. Average plot size is much smaller in Podor and Matam than in the Delta--0.31 ha versus 1.70 ha. Annex Table 20 gives the frequency distribution and the average number of members per GP for the Delta and Middle Valley.

As noted above, farmers generally do not request quantities under one bag (50 kg). Only occasionally do 2-4 farmers share a bag, or use one bag on more than one crop. For the Delta and Podor/Matam, respectively, the data show that 83 and 74 percent of farmers apply only whole bags; 9 and 12 percent share a bag; and 8 and 14 percent apply one bag on two crops. (Note: these data should be treated carefully, since few farmers are willing to admit that they use fertilizer in ways other than those recommended by SAED.)

Given these differences between the Delta and Podor and Matam departments, together with differences in fertilizer recommendations across perimeters (see Table 29), the following picture emerges:

-- for urea, significantly higher doses/ha in Podor/Matam (227 kg/ha on average, versus 165 kg/ha in the Delta);

-- for NPK, higher doses/ha in Podor/Matam also (147 kg/ha on average, versus 97 kg/ha in the Delta).

(Note: Non-users of these two fertilizer types were excluded when calculating these averages.)

There was a high percentage of refusal to apply NPK, due to delays in delivery and to its relatively higher price increase compared to urea. A significant drop in quantities used at Podor and Matam (compared to last year's use) was reportedly due primarily to the high prices, whereas the drop in utilization in the Delta resulted more from insufficient quantities available at the time of application or ongoing price discussions. There was a nearly complete refusal of NPK in Ndombo-Thiago, where only 1,150 kg was accepted versus the 38,000 kg originally requested.

Urea application was not yet adversely affected by delays in delivery or insufficient quantities. However, timely delivery of remaining quantities for the second application is required.

Table 29. Recommended Fertilizer Doses, Fleuve, 1984.

	RICE[a]		MAIZE[a]		TOMATO		
	UREA	NPK (18-46-0)	UREA	NPK (18-46-0)	UREA	NPK (18-46-0)	KCL
Recommended by SAED HQ[b]							
Delta	150	100	100	--	300	250	100
Middle Valley	200	150	100	--	--	--	--
Recommended by Perimeter/Delegation							
LAMPSAR	200	100	-	-	-	-	-
BOUNDOUM	150	100	-	-	-	-	-
COLONAT	150	200	-	-	200	300	200
NDOMBO-THIAGO	200	100	-	-	250	100	300
PODOR	200	150	100	150	-	-	-
MATAM	200	150	200	200	-	-	-

Source: 1984 perimeter survey data.

[a] Recommended doses of both fertilizer types are identical for wet and dry season crops.

[b] Figures for the Delta are for large perimeters; those for the Middle Valley are for PIV's (irrigated village perimeters).

Table 30 shows the frequency distribution and average values of fertilizer use for wet season irrigated rice. For both urea and NPK (18-46-0), the average amount of fertilizer used per hectare is greater in Podor and Matam than in the Delta. This is true whether one excludes or includes farmers who did not use these fertilizers. For the entire sample, the frequency distribution shows that:

a) for urea, 70 percent of farmers in the Delta use less than 150 kg/ha, and 61 percent of farmers in Podor and Matam use more than 150 kg/ha;

b) for NPK, 93 percent of farmers in the Delta use less than 100 kg/ha, and 35 percent of farmers in Podor and Matam use more than 100 kg/ha;

Excluding non-users of a given type of fertilizer, the figures are:

a) for urea, 68 percent of farmers in the Delta use less than 150 kg/ha, and 71 percent of those in Podor and Matam use more;

b) for NPK, 87 percent of farmers in the Delta use less than 100 kg/ha, and 70 percent of those in Podor and Matam use more.

The impact of price levels, combined with small farm sizes in Podor and Matam, resulted in higher fertilizer refusal rates compared to the Delta. (See Table 31.) Due to smaller cultivated areas, farmers in the Middle Valley tend to consume a higher proportion of their output than farmers in the Delta, who cultivate larger areas and sell a significant part of their produce. As such, the Delta farmers are less averse to cash investments than Middle Valley farmers who often have to rely on animal sales to finance cash expenditures.

Reactions of farmers to this year's price increases can be summarized under four headings: refusal, reduction of quantities (compared to last year's use), no change in quantity, and increased quantities. For urea, 53 percent of farmers in the Delta refused it or reduced the quantity utilized and only 8 percent increased it, whereas in Podor and Matam 53 percent of the farmers maintained or increased their amount used. For NPK on the other hand, 49 percent of farmers in the Delta maintained or increased the quantity used and less than one in three (31 percent) completely refused NPK, whereas in Podor and Matam it was the reverse--47 percent of the farmers refused to use NPK and 32 percent maintained or increased his quantity. These results are presented in Table 31. GP-level data generally show lower refusal rates, which is logical, and higher decreases in quantity percentages. In the Middle Valley, two GP's reported higher quantities for urea, and one GP

Table 30. Frequency Distribution and Average Farm-Level Fertilizer Doses, Fleuve, 1984.

	DELTA			MIDDLE VALLEY		
	Number	Percent	Adjusted Percent	Number	Percent	Adjusted Percent
UREA (Kg/Ha)						
0	4	5.2	-	9	13.0	-
1 - 50	2	2.6	2.7	1	1.5	-
51 - 100	24	31.2	32.9	4	5.8	6.8
101 - 150	24	31.1	32.9	13	18.8	22.0
151 - 200	13	16.9	17.8	9	13.1	15.3
201 - 250	6	7.8	8.2	19	27.5	32.2
251 - 400	2	2.6	4.1	11	16.0	18.6
Over 400	2	2.6	1.4	3	4.3	5.1
TOTAL	77	100.0	100.0	69	100.0	100.0
NPK (Kg/Ha)						
0	38	49.4	-	34	49.3	-
1 - 50	15	19.4	38.5	2	2.9	2.9
51 - 100	19	24.7	48.7	9	13.1	26.5
101 - 150	3	3.9	7.7	9	13.1	26.6
151 - 200	1	1.3	2.6	7	10.1	20.6
Over 200	1	1.3	2.6	8	11.5	23.5
TOTAL	77	100.0	100.1	69	100.0	100.1

Average Urea dose:	total sample	= 156.77 kg/ha	194.2 kg/ha
Average Urea dose:	adj. sample[a/]	= 165.36 kg/ha	227.1 kg/ha
Average NPK dose:	total sample	= 48.90 kg/ha	72.5 kg/ha
Average NPK dose:	adj. sample[a/]	= 96.55 kg/ha	147.1 kg/ha

Source: Field surveys, 1984

[a/] Adjusted percentages and averages after exclusion of farmers who did not use the corresponding fertilizer type.

Table 31. Impact of New Price Levels on Farmer Fertilizer Use, by Type of Fertilizer, Fleuve, 1984.

	D E L T A			MIDDLE VALLEY		
	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent
UREA (Utilization)						
Refusal	2	2.6	2.6	9	13.2	13.2
Reduction[a/]	39	50.6	53.2	23	33.8	47.0
Same use level	23	29.9	83.1	29	42.7	89.7
Increased use	6	7.8	90.9	7	10.3	100.0
Unknown	7	9.1	100.0	-	-	-
TOTAL	77	100.0	100.0	68	100.0	100.0
NPK (Utilization)						
Refusal	24	31.1	31.1	32	47.1	47.1
Reduction[a/]	15	19.5	50.6	14	20.6	7.1
Same use level	32 [b/]	41.6	92.2	20	29.4	7.1
Increased use	6	7.8	100.0	2	2.9	100.0
TOTAL	77	100.0	100.0	68	100.0	100.0

Source: Farm survey data, 1984.

[a/] All comparisons are with respect to last year's use levels.

[b/] A 50 kg limit was imposed because of insufficient availability at Boundoum. It is hard to predict how farmers would have reacted if supply had covered the usual 100 kg/ha dose; however, no reduction in urea use was observed at Boundoum. Boundoum farmers were added to the "same use" category since it is felt that farmers would not have reduced NPK quantity if sufficient amounts would have been available.

reported higher quantities for 18-46-0. In one case the GP refused NPK altogether and increased use of urea. One GP cultivated for the first time and as such their fertilizer utilization this year was automatically higher. GP reactions to price increases are also presented in Annex Table 21.

When farmers were asked why they had not used more fertilizer this year, their replies were quite similar in the Delta and Podor/Matam. The most frequently advanced reason for not using higher fertilizer quantities was the price level (60 and 63 percent in the Delta and Podor/Matam, respectively), followed by 18 and 16 percent, respectively, of farmers considering this year's amount the limit they will be able to reimburse, and 20 and 18 percent of farmers who reported an increase in amounts utilized.

One final observation. In several areas, farmers had postponed the first urea application because of the unavailability of herbicides. Especially in the Delta, where areas are too large for hand weeding, farmers perferred to wait for herbicides before applying urea. This delay may adversely affect yields, and will render the interpretation of the fertilizer-yield relation more difficult.

E. Attitudes and Opinions.

Forty-eight percent of farmers were generally satisfied with the current distribution system, and another 12 percent advanced no opinion. The best appreciated features of the system cited by farmers were (a) availability of fertilizer on credit, reimbursable after harvest (cited by 36 percent of farmers); (b) free transport of fertilizer to the village (cited by 8 percent); and (c) the distribution system as a whole (cited by 8 percent). Timely delivery and the newly established right of farmers to formulate their own fertilizer demands were cited by 5 and 6 percent of farmers, respectively. It should be noted that 10 percent of farmers did not express an opinion regarding the strong points of the SAED fertilizer distribution system, and 54 percent cited only one aspect to be conserved. Table 32 summarizes farmer views of the current SAED distribution system.

Figures at the GP level, shown in Table 32, are characterized by lower "no opinion" percentages. The rates of GP satisfaction with the current system are almost equal to those at the farmer level. Fewer "no opinion" replies are compensated by a higher percentage of GP presidents who would like to be consulted more by SAED. Credit remains the principal strong point of the SAED distribution system, but free transport and own formulation of

Table 32. Evaluation of the SAED Fertilizer Distribution System by Farmers and Farmer Group Presidents, 1984.

	DELTA		MIDDLE VALLEY		TOTAL SAMPLE	
	Number	Percent	Number	Percent	Number	Percent
PERFORMANCE						
Opinions of Farmers						
Satisfactory	24	31	45	66	69	48
Too slow	16	21	2	3	18	12
Lack of concertation	7	9	13	19	20	14
Too complicated	15	20	-	-	15	10
No opinion	5	7	6	9	11	7
Opinions of GP Presidents						
Satisfactory	5	25	12	71	17	46
Too slow	1	5	2	12	3	8
Lack of concertation	8	40	-	-	8	22
Other/no opinion	6	30	3	18	9	24
STRONG POINTS						
Opinions of Farmers[a/]						
Credit	61	39	44	32	105	36
Free transport	1	1	22	16	23	8
Timely delivery	10	6	4	3	14	5
Formulation of demands by farmers themselves	15	10	4	3	19	6
Whole system	6	4	16	12	22	8
No opinion	62	40	46	34	108	37
Opinions of GP Presidents						
Credit	15	38	13	38	28	38
Free transport	2	5	9	27	11	15
Timely delivery	2	5	2	6	4	5
Formulation of demands by the GP	7	18	-	-	7	10
Whole system	1	3	5	15	6	8
No opinion	13	33	5	15	18	24

Source: Farm survey data, 1984.

[a/] Most farmers mentioned two strong points, although without any explicit ranking. Both are included in this table, which doubles the number of observations. Credit was the most commonly mentioned strong point.

demand are more frequently cited by GP's than by farmers. Overall, 8 percent of GP presidents would like to retain the current system as it exists. Only 5 percent of GP presidents did not have an opinion on strong points of the SAED system and 38 percent mentioned only one strong point.

Regarding farmer views on the features of the ideal system, several points should be noted. If fertilizer were available only for cash purchase, 53 percent of farmers said they would like it to be available at the beginning of each agricultural season, 37 percent said they would prefer to have it available at the time of harvest and sale, and 10 percent said they would not buy fertilizer for cash (Table 33). However, farmers indicated their ideal system would be one that provides credit, either as in the current system (credit from SAED reimbursable after harvest, preferred by 28 percent), or by provision of loans at the GP or SV level, preferred by 61 percent (Table 34).

None of the GP's indicated they would refuse to purchase fertilizer for cash. If only cash sales were available, 43 percent would prefer fertilizer to be available when marketing the harvested crop and 46 percent at the start of the agricultural season(s). A clear difference exists between GP's in the Delta and in the Middle Valley with respectively 55 and 29 percent favoring cash purchases after harvest (Table 33). GP presidents in the Delta and in the Middle Valley also differed in their views on the ideal acquisition system. Sixty percent in the Delta prefer a GP or SV managed credit system and 15 percent would favor cash purchases at the same level. In the Middle Valley, the corresponding figures were 47 and 6 percent, while 35 percent would like the current system to be continued. Ninety percent of presidents in the Delta think the GP or SV could take over the fertilizer system if SAED were no longer there. The SV's are better established in the Delta and hardly function in the Middle Valley, which explains the different levels of confidence in the GP and SV as alternatives to SAED. (Table 34 summarizes farmer and GP opinions on ideal acquisition and alternatives to SAED.)

Farmer preferences differred between the Delta and Middle Valley. In the Delta, GP's are small and therefore a unit that farmers can identify with. Farmers and their representatives have a longer tradition of rice cultivation, and of dealing with SAED. Having been exposed to the accounting and distribution system, they consider themselves capable of assuming these functions; 75 percent preferred GP- or SV-managed credit versus 44 percent in

Table 33. Preferences of Farmers and GP Presidents Regarding Time of Fertilizer Availibility under a Cash Purchase System, Fleuve, 1984.

	D E L T A		MIDDLE VALLEY		TOTAL SAMPLE	
PREFERENCES	Number	Percent	Number	Percent	Number	Percent
FARMERS						
Time of harvest and sale	40	51.9	14	20.6	54	37.2
Beginning of each season	31	40.3	46	67.6	77	53.1
Will not buy for cash	6	7.8	8	11.8	14	9.7
TOTAL	77	100.0	68	100.0	145	100.0
GP PRESIDENTS						
Time of harvest and sale	11	55.0	5	29.4	16	43.2
Beginning of each season	9	45.0	8	47.1	17	46.0
Other	--	--	4	23.5	4	10.8
TOTAL	20	100.0	17	100.0	37	100.0

Source: Survey data, 1984.

Table 34. Ideal Acquisition Method and Preferred Alternative to SAED, Fleuve, 1984.

	DELTA		MIDDLE VALLEY		TOTAL SAMPLE	
	Number	Percent	Number	Percent	Number	Percent
IDEAL ACQUISITION[a]						
Opinions of Farmers						
GP managed credit	40	52	19	28	59	41
Current system	9	12	32	47	41	28
SV managed credit	18	23	11	16	29	20
Opinions of GP's						
GP managed credit	6	30	7	41	13	35
SV managed credit	6	30	1	6	7	19
Current system	1	5	6	35	7	19
GP or SV cash sales	3	15	1	6	4	11
Individual cash sales	2	10	--	--	2	5
Other	2	10	2	12	4	11
ALTERNATIVE TO SAED[a]						
Opinions of Farmers						
Producers groups	39	51	39	57	78	54
Village sections	29	38	14	21	43	30
Opinions of GP's						
Village sections	15	75	2	12	17	45
Producers groups	3	15	11	65	14	38
Other	2	10	3	18	5	14
No opinion	--	--	1	6	1	3

Source: Farm survey data, 1984.

[a]Only the most common responses are shown.

the Middle Valley. In the Middle Valley, GP's are large and often only recently established. Farmers' knowledge of the system and their confidence in being able to assume responsibility for fertilizer distribution are generally lower.

Most farmers were sceptical about the advantages of replacing SAED with another form of organization. When asked about the best alternative to SAED, assuming that SAED were no longer to handle input distribution, 84 percent said they would prefer their representatives to handle fertilizer distribution, provided credit is made available. Interestingly, in the Delta where farmers have larger areas (hence higher sales and revenues) and more off-farm income opportunities, 10 percent of farmers said they would prefer a system of individual purchases. This is also confirmed by the opinions of GP presidents, with respectively 10 percent and 15 percent preferring individual and GP level cash fertilizer purchases (Table 34).

At the perimeter level, credit was considered a prerequisite by all perimeter directors, except at Ndombo-Thiago where the experimentation with a transfer of responsibility to farmers is well underway and farmers control an operating fund which can be used for cash purchases of fertilizer. This year, farmers used this fund to make a substantial cash purchase of diesel fuel from Dakar to run the pumps. (However, farmers said the fund was not large enough to finance both fuel and fertilizer.) Also at Ndombo-Thiago and Colonat, where off-farm labor at the sugar factory is common, the SV's are considered capable of handling fertilizer distribution, including ordering fertilizers at the factory and arranging transport. One perimeter director suggested that the cash rebate ("ristourne") which is given to farmers who sell rice could be collected by SAED to build an operating fund, which could be used by farmers to buy fertilizer or other inputs. He suggested that this operating fund be managed at the SV level once the SV's are operational. The other perimeter directors were sceptical about this alternative to SAED, and advanced an interesting alternative, namely that SSEPC should have storage facilities at the regional or departmental level where farmers would be able to obtain fertilizer. Payment would be in cash, advanced by a national or rural bank as a seasonal credit ("crédit de campagne").

VIII. SUMMARY OF MAJOR FINDINGS[1/]

A. Late Delivery.

The most significant and negative feature of fertilizer distribution this year was late deliveries. Both NPK and urea arrived later than planned, and, except for urea in the Fleuve region, arrived late with respect to crop needs. For the **Casamance,** agronomic factors suggest that while fertilizer could have been used with full effectiveness on transplanted rice, it was probably only 70 percent effective on peanuts and direct-seeded rice, and 30 percent effective on maize and millet. For the **Sine-Saloum,** based on planting dates reported by SV's, 90 percent of farmers had completed millet planting and 38 percent had finished peanut planting by the time of the first fertilizer deliveries to SV's. NPK arrived too late to be used at the time of land preparation, and urea arrived too late to be used properly following plant emergence. Some late deliveries in the **Fleuve** were due to farmer attempts to renegotiate the price before taking delivery.

B. Fertilizer Sales and Storage.

In response to late deliveries, SV's in the Sine-Saloum sold 10 percent of the fertilizer received rather than distributing it to members. Eighty-one percent of the fertilizer sold was urea. Sales were less frequent in the Casamance, and practically non-existent in the Fleuve. Farmers sold very little of the fertilizer they received (about 1 percent). Their response was more one of storage, accounting for 18 percent of fertilizer received in the Sine-Saloum and 11 percent in the Casamance. Overall, only 72.5 percent of "retenue" fertilizer was actually applied by sample farmers in the Sine-Saloum, and 88 percent in the Casamance.

C. Ratio of Fertilizer Received to Peanut Sales.

There was considerable variability in the amount of "retenue" fertilizer received by SV's and farmers per ton of peanuts sold. The amounts received by SV's ranged from 22-60 kg/ton of peanuts sold in the Sine-Saloum, and from 31-60 kg/ton in the Casamance (NPK plus urea). Most farmers (89 percent in the Sine-Saloum) received less than the 55 kg/ton to which they were entitled. The average amount received per farmer in the sample was 39 in the Sine-Saloum (including the fertilizer equivalent of cash received from

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[1/] Because of the detail contained in Sections V to VII of this report, and, because of the thorough résumé of major findings contained in the November, 1984, report, this is a condensed presentation.

sales by the SV), and 52 kg/ton in the Casamance (43 kg/ton in Ziguinchor and 54 kg/ton in Kolda).

D. Average Quantities Received.

Overall, the amounts of fertilizer delivered under the retenue system were small, averaging 105 kg per farmer in the Sine-Saloum, and 98 in the Casamance. This is explained by (a) the size of the original retenue (5 CFA/kg of peanuts sold), (b) the doubling of the fertilizer price this year, and (c) the generally poor harvest (and thus sales) last year.

E. Non-Retenue Sources of Fertilizer.

Even smaller amounts were obtained from other sources. In the Casamance, farmers obtained 9.1 percent of their fertilizer from non-retenue sources (8.6 percent from PIDAC); in the Sine-Saloum, the figure was 27 percent (22 percent from cash purchases). Farmers sampled in the Fleuve obtained virtually no fertilizer from non-SAED sources.

F. Fertilizer Utilization.

Except for the Fleuve, farmer use of fertilizer was also very low. In the Casamance, the average was about 25 kg/ha (ranging from 16 to 41 kg/ha in the Departments surveyed). In the Sine-Saloum, utilization was less than 15 kg per hectare of millet and peanuts cultivated. In the Fleuve, for the Delta and Podor/Matam, respectively, fertilizer use (exclusively on irrigated parcels) was about 100 and 150 kg/ha of 18-46-0, and 165 and 225 kg/ha of urea.

G. Transport Costs Borne by Farmers.

In the Sine-Saloum, some SV's had to travel significant distances and/or make several trips to obtain fertilizer. Distances and transport costs were particularly high for the 19 SV's who obtained fertilizer directly from the CEPA's. For these SV's, the average roundtrip was 54 km, and transport costs ranged from 0.8 to 6.0 CFA/kg, averaging 3 CFA/kg. In the Casamance, most SV's took possession of fertilizer at the seccos; transport costs averaged 0.9 CFA/kg. In the Fleuve, the regional average transport and handling cost from Dakar (14.72 CFA/kg) was added to all fertilizer distributed, thus effectively subsidizing transport to the relatively distant Middle and Upper Valley while surcharging transport to the Delta.

H. Fertilizer Losses.

There were relatively minor problems with fertilizer losses during shipment, or with poor quality. In the Sine-Saloum, three tons were lost or

not received from Dakar; in the Casamance, 19.6 tons were not received. Urea bags were often poorly sealed, and compaction due to water damage was not uncommon.

I. Inadequate Financing and Records.

The major cause of delayed deliveries appears to have been shortage of financing and/or delayed payment at the top of the system. (We say "appears" since the study focussed at the regional level and below, hence we do not have direct information about events at the national level.) Variability in the fertilizer/peanut sales ratio occurred mainly because peanut sales records did not provide the information necessary for accurate calculation of fertilizer entitlements.

1. Financial constraints.

Financial problems seem to have delayed delivery from the manufacturer to SONAR, as well as transport from Dakar to the regions, hiring of transport for distribution within the regions, and (perhaps) the extension of the contracts of SONAR secco managers. In the Fleuve, SAED was unexpectedly unable to obtain bank credit, and had to mobilize its own resources to pay for fertilizer. This resulted in delay and smaller initial deliveries.

2. Inadequate records for the "retenue."

Peanut sales records were not always sufficiently detailed to permit accurate determination of fertilizer quantities due each SV and farmer. The structure of peanut marketing (based on SONACOS collection points established at selected SV's and on SONAR seccos) was not the same as the structure of fertilizer distribution (based on the SONAR secco and all SV's). The lack of sales records based on SV membership made it frequently impossible for SONAR agents to know how much fertilizer to allocate to each SV, and for SV leaders to know whether the amounts they received were only for their members or included amounts due to non-members who had sold peanuts through their SV. In addition, there were several sources of records, those kept by SONAR, by SONACOS, by the Cooperative Service, and by some SV's. The reported peanut sales figures were not always consistent from one source of records to another. Finally, the SV membership and sales records were also inadequate, which is not surprising given the relatively recent formation of most SV's.

J. Inadequate Planning of the Retenue System.

Although certain organizational problems were observed at the regional level, often their basic cause seems to have been a failure at the national level to foresee implementation problems and to plan accordingly. The two most problematic procedural issues were:

1. Procedures for converting the retenue from a paper transaction to a real transaction and for transferring this money to the fertilizer manufacturer/distributor in a timely fashion do not appear to have been clearly defined and/or administered.

2. The original plans for the retenue system do not seem to have taken into account the reality of the peanut marketing process and the difficulties of using the peanut sales records as the basis for fertilizer distribution at the SV level.

As a result of inadequate planning, SONAR was given the implementation responsibility without clear guidelines. SONAR officers in the field received instructions which arrived late and which were not sufficiently clear and comprehensive.

K. Delays Observed at the Regional Level.

In general the survey indicated that SONAR and SV staff at the regional level managed to distribute fertilizer rapidly once they had received it from Dakar. However, some significant delays did occur within the regions, often as a result of lack of instructions or other factors outside the control of regional personnel, such as: (a) impassable roads (due to early rains); (b) unstaffed seccos (due to late arrival of supplies from Dakar and problems in extending the contract of secco managers; (c) a general shortage of diesel fuel; and (d) lack of transport. When delays occurred at the SV level, they were usually because SV's disagreed with SONAR on the amount of fertilizer, or because SV's had trouble arranging transport. In the Fleuve, distribution was delayed when farmers attempted to persuade SAED to lower the price prior to delivery.

L. Weaknesses in Regional Organization.

A number of problems at the regional level could perhaps have been avoided or diminished. SONAR in the Sine-Saloum in particular did not have a consistent policy across departments with respect to calculating SV entitlements. Better management of personnel (e.g., not allowing SONAR drivers to go on vacation just when fertilizer began to arrive) and forward

planning for ordering supplies (e.g., sacks for rebagging) could also have alleviated some delays.

M. Attitudes and Opinions.

Based on interviews conducted at different levels, attitudes and opinions toward the current distribution system and alternative systems can be summarized as follows:

1. Farmers were relatively happy with the SAED distribution system. In the Delta, there were complaints about late deliveries, about the use of fertilizer stored in the Delta to make early shipments to Podor and Matam, and about lack of consultation by SAED, especially in setting prices.

2. Farmers were relatively unhappy with the SONAR system. Over 60 percent of farmers interviewed in the Sine-Saloum and Casamance cited late deliveries as the major problem with this year's distribution. High prices, small quantities, and the government's failure to honor its commitments (the prices doubled after the retenue system was initiated) were other problems noted.

3. Opinions on the retenue system were divided. SONAR employees were relatively the most favorable toward the system, while farmers were the least favorable.

4. All farmers complained about the substantial increase in fertilizer prices. However, except in the Fleuve, farmers tended to rate high prices as a substantially less important problem than late deliveries.

5. The opinions expressed by farmers suggest a need for some degree of credit. Many farmers cited a lack of financial means in explaining why they had not purchased more fertilizer when it was available for sale in 1982/83 at 45-52 CFA/kg.

6. Regarding the type of credit system preferred, farmers and SV's were generally strongly positive about the ability of SV's to obtain credit, manage it, and assure reimbursement. Over 75 percent of farmers and SV's in the Sine-Saloum and Casamance favored group rather than individual credit.

7. Regarding the time of the year when fertilizer should be available, over 80 percent of farmers in the Casamance and Sine-Saloum said if fertilizer were available for cash purchase they would like to be able to buy it at the time of harvest and crop sales. In the Fleuve, 53 percent of

farmers would prefer fertilizer to be available at the beginning of each agricultural season.

8. Information and accessibility are two other important factors affecting fertilizer acquisition. Thirty-nine percent of farmers surveyed in the Sine-Saloum said they did not buy fertilizer in 1982/83 either because it was not available in their area or because they had no information about it.

9. In terms of alternatives to SONAR or SAED as organizations to handle fertilizer distribution, most farmers said they would like the village section or cooperative to take this responsibility. Some recommended a combination of cooperatives and SV's, and some recommended collaboration between these organizations and rural development agencies.

10. Most farmers were not in favor of the involvement of private traders in fertilizer distribution. This opinion was shared by SONAR employees and SV's in the Sine-Saloum. Opposition to private traders was explained on the grounds that traders did not understand the problems of farmers, that traders would charge excessively high prices, and that they would not reach all farmers.

11. Given the limited time available for the survey, it was not possible to collect significant information on farmer attitudes regarding an "acceptable" price for fertilizer. In the Sine-Saloum, only 7 percent of farmers said they had bought fertilizer in 1982/83, when it was available for cash purchase at 45-52 CFA/kg. Forty-eight percent said they would have bought "some" fertilizer at 45 CFA/kg if it had been available at the time of peanut marketing in 1983/84.

IX. POLICY IMPLICATIONS.

A. Objectives and Policy Constraints.

In evaluating the current fertilizer distribution system, or in considering changes that might be made in the system, it is important to take into account what the system is intended to do (its objectives) and also other existing governmental policies which affect what can or cannot be done in reorganizing the fertilizer distribution system. Listed below are some of the key areas where the government is likely to have specific objectives or expectations for the fertilizer distribution system.

1. Amount and type.

One would like the distribution system to provide the appropriate amount and type of fertilizer. What is "appropriate" depends on whose point of view is considered, e.g., the farmer, the development agent, the agronomist, the economist, etc.

2. Timing.

Fertilizer should be provided at the appropriate time, in terms of when farmers want to acquire it and when it should be applied if utilization is to be effective.

3. Coverage.

The distribution system is typically expected to cover a certain geographical area, or to meet the needs of certain farmers.

4. Costs.

Two major aspects are involved here:

-- **cost-effectiveness:** the system should provide the desired benefits at minimum cost. This saves resources and thus potentially benefits everyone.

-- **distribution of costs:** the system involves many types of costs, of which some are borne by the government, others by manufacturers, transporters, and retailers (if any), and others by farmers or farmer groups. There is generally an objective of reducing the budgetary cost of the system to the government, and/or of reducing the financial cost of fertilizer to farmers. (Of course the two are not necessarily compatible.)

5. Production priorities.

The system is typically expected to support production of key crops, e.g., peanuts, millet/sorghum, rice, maize, and cotton. A given system may tend to favor some crops more than others.

6. Participants.

As a matter of political philosophy, the government may expect the system to be structured around certain actors, e.g., farmer groups such as the village section, or private traders, etc. The Senegalese government's interest in expanding the role of village sections and of the private sector in fertilizer distribution is probably based partly on the expectation that this will allow a reduction in the activity (and hence budgetary costs) of government organizations. However, participation of village sections is probably also considered desirable in terms of socialist principles.

It is not difficult to see that a fertilizer policy which gives priority to one objective could easily hamper the attainment of others. Such **conflicts among objectives** might include the following:

1. Distribution of the amount and type of fertilizer which farmers regard as appropriate (often lower than recommended quantities) would call for a different system from one which provides the amount and type consistent with agronomic or production policy objectives. For example, the pattern of distribution resulting from a cash sales system would be quite different from that associated with a "retenue" or credit system.

2. Which regions and farmers are covered by the system depends on other policies established. Distribution of fertilizer only to areas where its use is consistently economic would increase the rate of return from investment in fertilizer, but might exclude certain regions, e.g., the northern peanut basin. Charging the full cost of transport, rather than having a uniform price of fertilizer, would disfavor the more remote northern, eastern, and southern regions. A system based on private traders, unless heavily controlled by the government, might also result in neglect of remote areas.

3. Reducing the cost of fertilizer to farmers through subsidies might increase fertilizer use and thus contribute to production objectives. However, using government budgetary resources (or even foreign aid) for such a program would reduce funds available for other development programs. The value of the subsidy would therefore have to outweigh the potential reduction in the benefits received by farmers from other programs.

4. Promoting the participation of certain groups automatically limits how the system can be structured. For example, village sections and the private sector have certain preferences and capabilities with respect to the amount, timing, and procedures of fertilizer distribution.

These issues are perhaps obvious. **The point is two-fold: (a) the objectives of the fertilizer distribution system must be clearly established, and priorities set; and (b) the impact of alternative distribution systems on these objectives must be carefully analyzed.** In this discussion of policy implications we do not recommend a system of priorities but attempt to illustrate how various policy options will favor the attainment of different objectives. The discussion is centered around several major issues: organization of the distribution system; the retenue system; the cash sales alternative; price of fertilizer to farmers; and timing of fertilizer deliveries.

B. Organization of the Distribution System.

Farmers in the Fleuve region seem relatively satisfied with SAED's role in fertilizer distribution. This relative success results in part from the length of time SAED has operated in the region, and from the integration of input supply and other services in one organization. Whether SAED was better financed than SONAR this year (e.g., for transport) is not known; SAED may have been more effective but also more costly than SONAR. Other important factors include those which would be difficult to duplicate in other areas of Senegal. SAED's control over key production inputs (water, services, chemical inputs) gives them unusual leverage over farmers; without this, the credit system would not be as effective. The credit system is probably one of the key elements in farmers' current satisfaction with the fertilizer distribution system. However, elsewhere in Senegal, the government is reducing the role of rural development agencies, hence the "RDA-dominated" model is no longer acceptable. SAED itself is expected to reduce the subsidies on the services it provides farmers, and to gradually turn over to farmer groups the responsibility for provision of inputs, credit, and other services. By 1987, farmer groups are expected to organize these services themselves, and to finance them with credit from the CNCA (Caisse Nationale de Crédit Agricole) or commercial banks.

In the Sine-Saloum and Casamance, the survey results suggest that farmers would like to replace the government-run system with one involving a

major role for the village section and cooperative. There was limited interest in involvement of the regional development agencies, and practically no interest in the involvement of private traders. While these preferences are clear, it is not clear how realistic an assessment farmers have made of the capacity of the village section and cooperative to distribute fertilizer on time and at an acceptable cost. There is a long history of cooperatives in the Sine-Saloum, but the idea of the "coopérative mère" (mother cooperative) is a new one to farmers in both the Sine-Saloum and Casamance.

The question is what role the SV's and cooperatives are capable of fulfilling, and what assistance they need to do so? The results of the field study suggest that, at least in the next 2-3 years, it would be realistic to expect them to take responsibility only for distribution of fertilizer at the SV and farmer level, perhaps with the cooperatives collecting fertilizer from major distribution points within the region for onward distribution to SV's. A broader role would not be consistent with their current financial and physical resources, training, and organizational experience. Producers groups in the villages of Ndombo/Thiago in the Fleuve are successfully operating a cash fund for purchase of inputs. This is a model which SAED hopes to extend. However, these farmers have relatively large off-farm incomes, which makes it easier for them to mobilize the necessary cash.

Training in financial management for cooperative and SV staff would facilitate their successful involvement in input distribution. Two other weaknesses would need to be remedied: (a) **inadequate resources** at both the SV and cooperative level to assure transport of fertilizer; and (b) **lack of solidarity** among members of those SV's which were formed without due attention to the desires of member villages to associate with each other.

With respect to (a), although cooperatives in the Sine-Saloum own some trucks, if they wished to provide their own transport for input distribution they would probably need to find some means of financing additions to the truck fleet. Use of private transporters is a possibility, but the survey results indicated that when SV's arranged for transport on a piecemeal basis the costs were relatively high. Better rates might be obtained if the cooperative negotiated all transport contracts.

With respect to (b), in cases where solidarity does not exist within the SV, mistrust among members might rule out any input distribution system which required advance payment and hence collection of money which would be handled

by SV and/or cooperative staff. This seems to be an important issue for the cooperative service to resolve, given the frequency with which SV's in the sample reported that their member villages were unhappy with their SV affiliation.

C. The Retenue System.

The intended role of the retenue was to (a) prefinance the acquisition of fertilizer, and (b) provide farmers with a basic minimum amount of fertilizer. The retenue was to have been accompanied by credit and cash sales programs. In fact, this year the prefinancing does not seem to have worked, the quantities provided to farmers were very small (and often too late), and there were no accompanying credit or cash sales programs.

The drawbacks of the retenue system include: (a) farmers have no flexibility with respect to the type, price, amount, or timing of fertilizer obtained; (b) an effective system appears to depend on adequate financing, good records, and well-planned procedures--which have not yet been assured; (c) the amount of fertilizer available through the system for a given agricultural season is heavily determined by the previous year's harvest; and (d) the system provides fertilizer where peanuts are grown, which does not necessarily coincide with where it is needed for production of cereal crops.

One advantage of the retenue system is that in principle the government thereby assures minimum supplies of critical inputs. The question is at what cost? A costly government system puts as much burden on farmers as a system relying on private traders who might charge farmers high prices.

Regarding the amount of the retenue, the 5 CFA/kg retenue financed about 55 kg of fertilizer (NPK and urea combined) per ton of peanuts sold. Assuming yields of one ton/ha of peanuts, this means that only about one-third of the recommended amount of fertilizer for peanuts (150 kg/ha) and nothing for cereals is financed through the retenue, given current prices. Using some of this fertilizer on cereals (which is what was encouraged this year) means an even smaller fraction of the recommended amount available for peanuts. (Note that only 14 percent of farmers in the Sine-Saloum said that a higher retenue would be a good way of increasing the amount of fertilizer provided. However, this may have reflected general dissatisfaction with the retenue. If farmers could be confident of receiving the correct amounts of fertilizer on time, they might accept an increase in the retenue.)

Assuming that the retenue system is to be continued for at least one more year, the following measures must be given priority attention.

1. **Fertilizer must be delivered to farmers on time. Otherwise, the credibility of the retenue system, and perhaps of other future distribution systems, may be irreparably damaged.**

2. **To ensure timely delivery, proper financing and payment are also essential.**

3. To ensure that farmers receive the amounts to which they are entitled, steps must be taken to improve peanut sales and SV membership records, and to formulate easy-to-implement distribution procedures.

4. To make available more significant quantities of fertilizer, the amount of the retenue may need to be increased, or the price of fertilizer lowered if the retenue remains the same.

D. Cash Sales.

The farmers' perception that they lack financial resources would limit the demand for fertilizer on a cash sale basis. This year, 22 percent of the fertilizer obtained by farmers sampled in the Sine-Saloum and less than 1 percent of that obtained by farmers sampled in the Casamance was purchased for cash--mostly parallel market Gambian fertilizer at about 25 CFA/kg. If a system of cash sales were implemented, many farmers indicated that they would prefer having fertilizer available for purchase at the time of peanut or rice sales. Farmers would clearly have more cash available to spend at this time of the year.

Thus, there appear to be several prerequisites to a successful cash sales program:

1. Fertilizer should be made available at the time of commercialization.

2. The government would have to finance the full peanut price at the time of marketing. This would be 55 CFA/kg instead of the current 50 CFA/kg, assuming that the 15 CFA/kg retenue for seed is maintained. If the seed retenue is dropped too, 70 CFA/kg would be required.

3. Information about the price and location of sales outlets should be widely disseminated.

4. It may be desirable to coordinate fertilizer price policy with the Gambia; availability of cheap Gambian fertilizer will reduce the demand for Senegalese fertilizer in border areas.

E. Fertilizer Price.

This question merits more careful study, yet the limited data obtained, as well as other impressions gained through the survey, suggest that the demand for fertilizer would (at least initially) be quite limited at prices close to the existing real cost of fertilizer (90-100 CFA/kg).1/ (The Fleuve may be an exception; even if prices increase, there is a strong possibility that farmers will increase fertilizer doses at least to their 1982/83 levels, if they see a negative effect on yields from this year's reduction in fertilizer application.) In the Sine-Saloum and Casamance, farmers have not bought much fertilizer for cash at 45 CFA/kg; as noted, 52 percent of farmers surveyed in the Sine-Saloum said they would not have bought any fertilizer this year at 45 CFA/kg.

F. Timing.

The vital importance of timely deliveries has already been emphasized. The impact of late deliveries on agriculture this year was perhaps aggravated by the earliness of the rains in some areas. However, it would be prudent to initiate the entire process (other than peanut sales, of course) two months earlier than this year's schedule, to ensure that fertilizer is in the field in April or May. (Based on informal information from ICS, the current schedule calls for estimates of fertilizer needs by 15 December, a firm order with 30 percent down payment by 15 February, and delivery of fertilizer in May/June.) Obviously, switching to a cash sales system with fertilizer available at the time of peanut marketing (e.g., November) would require an even earlier schedule.

G. Summary of Major Recommendations.

1. The highest priority must be given to ensuring timely delivery of fertilizer to farmers. This is absolutely essential if the benefits of fertilizer are to be realized.

2. Adequate financing and prompt payment are necessary to achieve timely delivery of fertilizer. These elements must be assured by the central authorities concerned.

1/It should be noted that the results of this study and of other research show that factors other than price affect farmers' decisions to use fertilizer. These include: timing and place of availability; information on how to use fertilizer properly; the magnitude of yield response to fertilizer, and its variability in response to rainfall; the sale price of crop output; the supply and cost of complementary inputs (e.g., herbicides); cash flow constraints and the farmer's ability to bear risk; and the returns from fertilizer investment relative to returns from other investments open to the farmer.

3. No matter what new distribution system is adopted, improved record keeping will be necessary for efficient performance. If the retenue system is continued, records of peanut sales and village section membership must be improved to permit distribution of the correct quantities to each SV and farmer.

4. Support must be given to SV's and cooperatives to enable them to play a broader role in fertilizer distribution, as well as in other development activities. Training in financial management would be one important way of strengthening the capacity of SV's and cooperatives. Reviewing the village composition of the SV's may help improve solidarity among SV members, and thus improve the basis for successful group action.

X. TOPICS FOR FURTHER STUDY.

A. The nature of financial and administrative constraints experienced at the national level this year should be identified, with a view to alleviating them next year.

B. Farmer attitudes need to be assessed in a more narrowly focussed, in-depth study. This applies to perceptions of the costs and benefits of fertilizer use, what constitutes an "acceptable" price, alternative credit and distribution procedures, and the advantages and disadvantages of involvement by private traders.

C. There should be an expanded analysis of the profitability of fertilizer use, from the farmer's point of view as well as from the national economic point of view. It is particularly important that the analysis improve on previous studies with respect to treatment of uncertainty in agricultural production, the resulting risks which the farmer faces, and the farmer's ability to bear risk. Capital constraints at the farm level, which limit the farmer's ability to acquire fertilizer even when desired, should also be assessed. The benefits obtained from a retenue-based system which provides farmers very small amounts of fertilizer should also be examined in relation to the costs of such a system.

D. The resources and attitudes of potential private sector participants in fertilizer distribution (e.g., manufacturers, distributors, private traders, and transporters) should be investigated further to ascertain the feasibility and nature of their possible involvement.

Annex Table 1. Quantity of 6-20-10 in Tons Attributed, Received, Placed and Distributed, Casamance, 1984. a/

	June			July				August			
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
						(W E E K S)					
Department	1	2	3	4	5	6	7	8	9	10	11
Oussouye											
Attributed	12.05										
Received	12.05										
Placed	12.05										
Distributed	---	---	---	4.50	12.05						
Ziguinchor											
Attributed	141.45										
Received	141.45										
Placed	141.45										
Distributed	---	---	74.15	134.45	141.45						
Bignona											
Attributed	598.30										
Received	596.30	598.30	598.30								
Placed	528.05	528.05	598.30								
Distributed	---	---	350.00	481.78	500.10	500.10	523.52	564.65	577.81	577.81	577.81
Sédhiou I											
Attributed	1,139.50										
Received	500.20	702.70	903.00	903.00	928.00	928.00	1,120.55	1,120.55	1,120.55	1,120.55	1,120.55
Placed	500.20	702.70	782.85	782.85	852.85	852.00	895.80	927.45	984.40	1,088.45	1,113.95
Distributed	---	---	300.00	589.20	589.20	589.20	867.50	927.45	984.40	1,088.45	1,113.95

(Table continued on next page)

Annex Table 1, continued.

	June				July			August			
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
						(W E E K S)					
Department	1	2	3	4	5	6	7	8	9	10	11
Sédhiou II											
Attributed	620.35										
Received	289.75	289.75	289.75	289.75	289.75	289.75	373.90	620.35			
Placed	289.75	289.75	289.75	289.75	289.75	289.75	373.90	394.14	480.15	597.75	620.35
Distributed	---	---	123.25	250.00	262.80	262.80	289.75	314.05	480.15	597.75	620.35
Kolda											
Attributed	1,128.45										
Received	731.00	731.00	731.00	731.00	731.00	731.00	1,128.45				
Placed	731.00	731.00	731.00	731.00	731.00	731.00	731.00	988.55	1,009.00	1,066.85	1,116.10
Distributed	---	---	---	---	---	363.25	549.35	943.20	1,009.00	1,066.85	1,116.10
Vélingara											
Attributed	365.75										
Received	195.00	355.00	355.00	355.00	355.00	365.75					
Placed	195.00	217.05	355.00	355.00	355.00	365.75					
Distributed	---	---	---	90.00	90.00	189.80	365.75	365.75			
Casamance											
Attributed	4,005.85										
Received	2,465.75	2,830.25	3,030.55	3,030.55	3,030.55	3,066.30	3,740.45	3,986.90	3,986.90	3,986.90	3,986.90
Placed	2,397.50	2,692.30	2,910.40	2,910.40	2,910.40	2,991.15	3,118.25	3,427.70	3,591.10	3,870.60	3,967.95
Distributed	---		847.40	1,549.93	1,549.93	2,058.65	2,746.87	3,268.60	3,570.61	3,850.11	3,947.46

Source : S O N A R, Ziguinchor, 1984.

a/Reception = CEPA level; placement = secco level; distribution = village section level.

Annex Table 2. Percentage Reception, Placement and Distribution of 6-20-10, Casamance, 1984 a/

	June		July					August			
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
					(W E E K S)						
Department	1	2	3	4	5	6	7	8	9	10	11
Oussouye											
Received	100.00										
Placed	100.00										
Distributed	---	---	---	37.00	100.00						
Ziguinchor											
Received	100.00										
Placed	100.00										
Distributed	---	---	52.42	95.00	100.00						
Bignona											
Received	99.66	100.00									
Placed	88.25	100.00									
Distributed	---	---	58.49	81.00	84.00	87.50	92.31	94.37	96.57	96.57	96.57
Sédhiou I											
Received	43.89	61.66	79.24	79.24	81.00	98.33	98.33	98.33	98.33	98.33	98.33
Placed	43.89	61.66	68.70	68.70	75.00	78.61	79.78	81.39	86.38	95.51	97.75
Distributed	---	---	26.32	52.00	52.00	76.12	79.27	81.39	86.38	95.51	97.75
Sédhiou II											
Received	46.70	46.70	46.70	46.70	46.70	60.27	100.00				
Placed	46.70	46.70	46.70	46.70	46.70	60.27	61.56	63.53	77.39	96.35	100.00
Distributed	---	---	19.86	40.00	42.00	46.70	50.62	50.62	77.39	96.35	100.00
Kolda											
Received	64.77	64.77	64.77	64.77	64.77	100.00					
Placed	64.77	64.77	64.77	64.77	64.77	65.00	74.83	87.69	89.41	94.54	98.90
Distributed	---	---	---	---	32.00	48.68	70.33	83.58	89.41	94.54	98.90
Vélingara											
Received	53.31	97.06	97.06	97.06	100.00						
Placed	53.31	59.34	97.06	97.00	100.00						
Distributed	---	---	---	25.00	52.00	99.31	100.00				
Casamance											
Received	61.55	70.65	75.65	76.00	77.00	93.37	99.52	99.52	99.52	99.52	99.52
Placed	59.84	67.20	72.65	73.00	75.00	77.84	81.20	85.65	89.64	96.62	99.05
Distributed	---	---	21.15	39.00	51.00	68.57	76.95	81.59	89.13	96.11	98.54

Source : S O N A R, Ziguinchor.

a/See notes to Annex Table 1.

Annex Table 3. Percentage Reception, Placement and Distribution of Urea, Casamance, 1984 a/

	June			July				August			
	11-17	18-24	25-01	02-08	09-15	16-22	23-29	30-05	06-12	13-19	20-26
					(W E E K S)						
Department	1	2	3	4	5	6	7	8	9	10	11
Oussouye											
Received	---	---	---	---	---	100.00					
Placed	---	---	---	---	---	100.00					
Distributed	---	---	---	---	---	100.00					
Ziguinchor											
Received	---	---	---	---	97.00	100.00					
Placed	---	---	---	---	48.00	100.00					
Distributed	---	---	---	---	---	100.00					
Bignona											
Received	---	---	---	92.00	92.00	99.72	99.72	99.72	100.00		
Placed	---	---	---	23.00	34.00	36.95	58.96	72.29	95.60	100.00	
Distributed	---	---	---	---	4.78	26.00	31.39	50.28	64.56	81.29	81.29
Sédhiou I											
Received	---	---	---	34.00	100.00						
Placed	---	---	---	---	5.58	8.10	12.67	14.60	22.73	42.06	90.14
Distributed	---	---	---	---	---	8.10	12.67	14.60	22.73	42.06	90.14
Sédhiou II											
Received	---	---	---	20.00	20.00	92.41	97.89	99.58	100.00		
Placed	---	---	---	20.00	20.00	20.00	22.88	22.88	31.72	69.41	69.41
Distributed	---	---	---	---	---	---	7.56	7.56	31.72	52.18	52.18
Kolda											
Received	---	---	---	25.00	99.86	99.86	99.86	99.86	99.86	99.86	99.86
Placed	---	---	---	---	---	24.05	44.29	59.50	71.47	83.53	91.00
Distributed	---	---	---	---	---	6.51	33.50	51.33	67.51	83.53	91.00
Vélingara											
Received	---	---	---	77.00	77.00	100.00					
Placed	---	---	---	77.00	77.00	45.00	100.00				
Distributed	---	---	---	---	29.00	45.00	93.90	93.90	93.90	100.00	
Casamance											
Received	---	---	---	41.00	84.00	98.73	99.59	99.83	99.96	99.96	99.96
Placed	---	---	---	14.00	19.00	20.15	41.45	48.27	58.81	74.23	89.89
Distributed	---	---	---	---	3.35	10.12	31.32	39.72	52.50	68.73	84.39

Source : S O N A R, Ziguinchor.

a/See notes to Annex Table 1.

Annex Table 4. Source of Supply and Utilization of Fertilizer by Crop for Maniora Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	NPK	UREA	TOTAL
Peanuts					
SONAR	-	3,638.2	-	-	3,638.2
Millet					
SONAR	-	991.2	-	35.2	1,026.4
Rice					
SONAR	-	231.6	-	1,489.6	1,721.2
Sorghum					
SONAR	-	291.2	-	27.6	318.8
Maize					
SONAR	-	768.8	-	639.0	1,407.8
Cotton					
SONAR	-	-	-	51.6	51.6
Total	-	5,921.0	-	2,243.0	8,164.0

Source: 1984 field survey.

Annex Table 5. Source of Supply and Utilization of Fertilizer by Crop for Simbandi Brassou Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	NPK	UREA	TOTAL
Peanuts					
SONAR	-	22.0	87.0	1,883.4	1,992.4
Millet					
SONAR	-	-	389.2	-	389.2
Rice					
SONAR	-	33.0	5,403.4	-	5,436.4
Sorghum					
SONAR	-	-	58.0	1,255.6	1,313.6
Maize					
SONAR	-	-	85.2	-	85.2
Cotton					
SONAR	-	-	-	-	-
TOTAL	-	55.0	6,022.8	3,139.0	9,216.8

Source: 1984 field survey.

Annex Table 6. Source of Supply and Utilization of Fertilizer by Crop for Sédhiou Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	NPK	UREA	TOTAL
Peanuts					
SONAR	-	-	547.0	49.0	596.0
Other Farmer	-	-	150.0	-	150.0
TOTAL	-	-	697.0	49.0	746.0
Millet					
SONAR	-	-	1,860.6	35.0	1,895.6
Other Farmer	-	-	15.0	-	15.0
Merchant	-	-	150.0	-	150.0
TOTAL	-	-	2,025.6	35.0	2,060.6
Rice					
SONAR	-	-	631.6	353.6	985.2
Sorghum					
SONAR	-	-	152.8	36.0	188.8
Maize					
SONAR	-	-	228.0	250.4	478.4
TOTAL	-	-	3,735.0	724.0	4,459.0

Source: 1984 field survey.

Annex Table 7. Source of Supply and Utilization of Fertilizer by Crop for Oussouye Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	N P K	UREA	TOTAL
Peanuts					
SONAR	-	50	45	66.6	161.6
Millet					
SONAR	-	-	96	-	96.0
Rice					
SONAR	42	-	358	130.0	530.0
Gift	3	-	-	50.0	53.0
PIDAC	-	-	210	50.0	260.0
TOTAL	45	-	568	230.0	843.0
Sorghum					
SONAR	-	-	-	44.4	44.4
Maize					
SONAR	-	-	30	-	30.0
TOTAL	45	50	739	341.0	1,175.0

Source: 1984 field survey.

Annex Table 8. Source of Supply and Utilization of Fertilizer by Crop for Kaguite Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	NPK	UREA	TOTAL
Peanuts					
SONAR	-	82.4	-	-	82.4
Rice					
SONAR	220.0	123.6	-	-	343.6
Maize					
SONAR	80.0	-	-	-	80.0
TOTAL	300.0	206.0	-	-	506.0

Source: 1984 field survey.

Annex Table 9. Source of Supply and Utilization of Fertilizer by Crop for Karongue Zone, Casamance, 1984.

Crop/Source	(Kilograms) 8-18-27	6-20-10	NPK	UREA	TOTAL
Peanuts					
SONAR	284.2	100.0	-	505.0	889.2
Merchant	-	450.0	-	-	450.0
PIDAC	-	90.0	40.0	110.0	240.0
Gambia	20.0	-	-	20.0	40.0
TOTAL	304.2	640.0	40.0	635.0	1,619.2
Millet					
SONAR	-	62.4	-	10.0	72.4
Rice					
SONAR	486.8	65.0	323.0	257.0	1,131.8
PIDAC	30.0	100.0	160.0	432.2	722.2
TOTAL	516.8	165.0	483.0	689.2	1,854.0
Sorghum					
PIDAC	-	-	30.0	-	30.0
Maize					
SONAR	95.0	11.6	30.0	580.8	717.4
PIDAC	120.0	60.0	50.0	180.0	410.0
Gambia	30.0	-	-	30.0	60.0
TOTAL	245.0	71.6	80.0	790.8	1,187.4
TOTAL	1,066.0	939.0	633.0	2,125.0	4,763.0

Source: 1984 field survey.

Annex Table 10. Frequency Distribution of Amount of Fertilizer Received per Ton of Peanuts Sold by Farmers, Casamance, 1984.

Interval (Kg/ton)[a]	No. of Farmers	Percent of Farmers	Cumulative Percent of Farmers
Less than 15	40	17.5	17.5
15-24	9	3.9	21.4
25-34	14	6.1	27.5
35-44	46	20.2	47.7
45-54	35	15.4	63.1
55-64	36	15.8	78.9
65-74	17	7.5	86.4
75-84	5	2.2	88.6
85-94	0	0.0	88.6
95 or more	26	11.4	100.0
TOTAL	228	100.0	100.0

Source: Field survey, 1984.

[a]Kilograms of fertilizer received by the farmer under the retenue system, divided by tons of peanuts sold by the farmer in 1983/84. In principle, farmers were to receive 55 kg of fertilizer per ton of peanuts sold.

Annex Table 11. Movement of Fertilizer from Dakar to CEPA's, Sine-Saloum, 1984.

CEPA	Quantity Planned (Kg)	First Delivery	Last Delivery	Percent Total Allotment Received			Total Quantity Not Received (Kg)
				As of 18 June	As of 27 July	As of 11 August	
Gossas	1,368,520	27 June	3 Aug	0	79.89	100.00	0
Kaffrine	2,184,830	12 July	28 July	0	66.68	99.98	350
Kaolack	2,992,850	8 May	2 Aug	53.85	94.35	99.98	450
Koungheul	1,578,580	26 June	18 Aug	0	66.41	99.97	350
Nioro	2,060,840	7 May	25 July	68.65	95.35	99.95	920
TOTAL	10,135,620	7 May	18 Aug	29.86	82.43	99.97	2080

Source: SONAR documents and field survey data, 1984.

Annex Table 12. Movement of Fertilizer from CEPA's to Village Sections, Sine-Saloum, 1984.[a/]

CEPA	Percent of Total Allotment Moved to Sections							
	As of 13 Jul	As of 27 Jul	As of 3 Aug	As of 11 Aug	As of 18 Aug	As of 24 Aug	As of 30 Aug	As of 18 Sep
Gossas	?	56.7	90.4	97.4	100.0	100.0	100.0	100.0
Kaffrine	0	b/	95.5	b/	99.9c/	99.9	99.9	99.9
Koungheul	0	b/	36.9	b/	67.6c/	89.2	99.9	99.9
Kaf/Koung	0	42.8	71.4	80.6	89.3	95.5	99.9	99.9
Kaolack	18.8	43.6	66.8	85.1	94.5d/	95.6	96.8e/	99.9
Nioro	37.9	71.0	90.9	94.4	98.6d/	99.9	99.9	99.9

Source: SONAR documents and field survey data, 1984.

a/ There is some confusion in SONAR documents between distribution to seccos and SV's, therefore these percentages may be slight overestimates of amounts reaching SV's at each date.

b/ Data for Kaffrine and Koungheul CEPA's not available for these dates; only the departmental total is available (line 4 of table).

c/ Data for CEPA's is 16 August; an additional 100,000 kilos of urea was distributed between 16 and 18 August, and is reflected in line 4.

d/ Slow distribution due to shortage of diesel fuel.

e/ The last 3 percent was delayed because 35,920 kilos had to be repackaged due to torn sacks; no sacks were available and they had to be ordered from Dakar.

Annex Table 13. Movement of Fertilizer from Seccos to Village Sections in the Sample, Sine-Saloum, 1984.

Secco ID	Total Tons [a]	Number Seccos Served	Dates of Delivery To Secco First	Dates of Delivery To Secco Last	Dates of Distribution To Sections [b] First	Dates of Distribution To Sections [b] Last	Days Between 1st Delivery and 1st Distribution	Days Between Last Delivery and Last Distribution	Total Days For Entire Operation
Department of Fatick									
11	82.600	19	11 July	17 Aug	12 July	17 July	1	0	37
12	100.300	10	13 July	28 July	15 July	24 Aug	2	-	-
13	72.800	14	18 July	27 July	23 July	31 July	5	4	13
14	40.970	16	21 July	22 Aug	7 Aug	27 Aug	17[d]	5	37
Department of Foundiougne									
21	86.350	13	13 July	5 Aug	17 July	30 Aug[c]	4	-	-
22	229.100	17	25 July	4 July	8 Aug	17 Aug	15[d]	13	23
23	52.150	13	24 July	28 July	29 July	20 Aug[c]	5[d]	-	-
Department of Gossas									
31	152.800	10	20 July	29 July	23 July	2 Aug	3	4	13
32	62.774	7	21 July	5 Aug	21 July	13 Aug	0	13	23
33	32.841	4	25 July	5 Aug	25 July	5 Aug	0	0	12
Department of Kaffrine									
41	289.183	27	14 July	23 Aug	16 July	24 Aug	2	1	41
42	1,528.230	118	26 July	18 Aug	12 July	30 Aug	17[g]	12	65[h]
43	227.935	13	24 July	23 Aug	17 Aug	28 Aug	24[d]	5	35
44	126.944	23	16 July	1 Aug	17 July	8 Aug	1	7	23
45	95.027	4	27 July	3 Aug	8 Aug	8 Aug	12[d]	5	12
46	366.579	36	13 July	20 Aug	13 July	21 Aug[i]	0	-	-
Department of Kaolack									
51	29.600	4	10 July	15 July	1 Aug	3 Aug	21[j]	19	24
52	8.800	8	16 July	16 July	31 July	10 Aug	15[k]	25	25
Department of Nioro									
61	5.650	3	28 July	28 July	28 July	22 Aug	0	25[d]	25
62	211.300	8	20 July	22 July	20 July	22 Aug	0	0	33
63	43.800	10	01 Aug	14 Aug	01 Aug	14 Aug	0	0	14

Source: Field survey data, 1984. (See next page for notes.)

Notes to Annex Table 13

a/Frequently the tonnage figures given by secco managers did not agree with those given by CO.D.'s (particularly true in Nioro). Tonnages given by the CO.D.'s were used consistently when differences occurred.

b/Distribution dates given by secco managers occasionally contradicted those given by SV's. In each case a judgment was made as to which dates were the most reliable.

c/As of 24 August, two sections had failed to come, one because the president was busy selling political party membership cards. The reason for the other delay was not known. A reported 3,340 of 100,300 kg remained undistributed.

d/The first distribution was delayed because the manager waited until all stocks were received.

e/As of 20 August, one section had not taken its 20,100 kg. The manager did not know exactly why but claimed that distribution procedures had not yet been defined.

f/As of 20 August, one section refused their allotment of 1,000 kg claiming it was too small.

g/The season for delay was the death of the secco manager.

h/Secco 42 (Koungheul) is a CEPA but like a secco delivered exclusively to sections, therefore it is included.

i/As of 21 August, one section had not yet claimed their 3,097 kg for unknown reasons.

j/The first distribution was delayed because the manager went to Kaolack to prepare his report on seed distribution.

k/The first distribution was delayed because the manager had to wait for the ABC to calculate quantities due to each section; sections later disputed the quantities.

l/Distribution ended late because the president of one section was accused of stealing and selling the section's NPK; this caused problems when the secco manager tried to deliver the remaining urea.

Annex Table 14. SAED Cost of Transport and Adjusted Sales Price of Urea, Fleuve, 1984.

Perimeter	Tons Transported	Transport Cost Per Ton from Dakar	Value (FCFA)	FCFA Per Kg
Lampsar	318.00	9,424	2,996,032	86.22
Télèl/Grande Digue	287.60	10,168	2,924,316	86.97
Déby/Boundoum	364.50	10.757	3,920,926	87.56
Richard-Toll	282.80	11,687	3,305,084	88.49
Ndombo/Thiago	90.50	12,152	1,099,756	88.95
Dagana	281.00	12,586	3,536,666	89.39
Ngallenka	21.00	13,857	290,997	90.66
Nianga	90.00	14,539	1,308,510	91.34
----------(Perimeters above line surcharged; below line subsidized)[a/]------				
Guédé	192.75	15,314	2,951,773	92.164
Aéré-Lao (Podor)	840.00	17,980	15,103,200	94.78
Matam	298.25	21,762	6,490,516	98.56
TOTAL	3,066.40	ave.=14,323 CFA/ton	43,920,516	---

Calculation of Adjusted Sales Price[b/]

	(FCFA)
Total transport cost	43,920,516
Total value of urea (3,066.40 x 76,800 FCFA)	235,499,520
Handling costs (3,066.40 x 400 FCFA)	1,226,560
TOTAL COST	280,654,596

Weighted Average Adjusted Sales Price Per Kilogram

280,654,596/3,066.40 = **91.52 FCFA/kg**

Source: SAED, 1984.

[a/] Perimeters above this line are effectively surcharged, since the price they pay per kg (91.52) is more than the value including actual transport costs. Perimeters below the line are effectively subsidized, since they pay less than the actual cost.

[b/] Adjusted sales price is a translation of "prix de retrocession" in French.

Annex Table 15. SAED Cost of Transport and Adjusted Sales Price of NPK (18-46-0), Fleuve, 1984.

Perimeter	Tons Transported	Transport Cost Per Ton from Dakar	Value (FCFA)	FCFA Per Kg
Lampsar	212.00	9,424	1,997,888	143,42
Télèl/Grande Digue	205.00	10,168	2,084,440	144.17
Déby/Boundoum	243.00	10,757	2,613,951	144.76
Richard-Toll	131.60	11,687	1,530,009	145.69
Ndombo/Thiago	125.85	12,152	1,529,329	146.15
Dagana	225.30	12,586	1,835,626	146.59
Ngallenka	15.00	13,857	2,078,550	147.86
Nianga	61.95	14,539	900,691	148.54
----------(Perimeters above line surcharged; below line subsidized)[a/]------				
Guédé	144.75	15,314	2,216,702	149.31
Aéré-Lao (Podor)	387.50	17,980	6,967,250	151.98
Matam	179.80	21,762	3,912,600	155.76
Bakel	5.35	23,312	124,719	157.31
TOTAL	1,937.10	ave.=14,868 CFA/ton	28,799,963	---

Calculation of Adjusted Sales Price[b/]

	(FCFA)
Total transport cost	28,799,963
Total value of NPK (1,937.10 x 134,000 FCFA)	259,571,400
Handling costs (1,937.10 x 400 FCFA)	774,840
TOTAL COST	289,146,203

Weighted Average Adjusted Sales Price Per Kilogram

289,146,203/1,937.10 = **149.26 FCFA/kg**

Source: SAED, 1984.

[a/] Perimeters above this line are effectively surcharged, since the price they pay per kg (149.26) is more than the value including actual transport costs. Perimeters below the line are effectively subsidized, since they pay less than the actual cost.

[b/] Adjusted sales price is a translation of "prix de retrocession" in French.

Annex Table 16. Fertilizer Delivery and Distribution Dates and Quantities, Lampsar Perimeter, Fleuve, 1984.

	(Dates: Day/Month)										
	13/08	22-26/08 [a]	27/08-2/09	3-9/09	10-16/09	17-23/09	24-30/09	1-7/10	8-14/10	15-21/10	22-30/10 [b]
UREA	(Figures in Tons)										
Delivery	200.00	--	--	--	--	24.98	48.85	--	79.78	--	--
Cumul. Delivery	200.00	200.00	200.00	200.00	200.00	224.98	273.83	273.83	353.61[c]	353.61	353.61
Distribution	--	12.25	43.35	34.75	72.22	24.10	10.60	73.60	39.85	5.45	4.80
Cumul. Distrib.	--	12.25	55.60	90.35	162.57	186.67	197.27	270.87	310.72	316.17	320.97[d]
NPK (18-46-0)											
Delivery	100.00[c]	--	--	--	--	--	--	--	--	--	--
Cumul. Delivery	100.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Distribution	--	2.96	13.50	9.45	18.50	3.10	11.90	5.20	7.35	1.50	1.60
Cumul. Distrib.	--	2.96	16.46	25.91	44.41	47.51	59.41	64.61	71.96	73.46	75.06[d]

Source: Field survey and interview data, 1984.

[a] The first distribution for both urea and 18-46-0 was on 22/08.

[b] Data were collected up to 30 October for both fertilizer types.

[c] Delivery was completed at this point.

[d] Distribution was still continuing for the second application of urea.

Annex Table 17. Frequency Distribution of Fertilizer "Exits" from the SAED Warehouse at Lampsar, 1984.

"Exit" Quantity	Up to 9 October Number	Up to 9 October Percent	Up to 30 October Number	Up to 30 October Percent	TOTAL Number	TOTAL Percent
UREA						
Less than 500 kg	2	6.5	4	30.8	6	13.6
500-1,000 kg	0	0	3	23.1	3	6.8
1,001-2,000 kg	2	6.5	6	46.1	8	18.2
2,001-5,000 kg	6	19.3	-	-	6	13.6
5,001-10,000 kg	8	25.8	-	-	8	18.2
10,001-20,000 kg	8	25.8	-	-	8	18.2
Over 20,000 kg	5	16.1	-	-	5	11.4
TOTAL	31	100.0	13	100.0	44	100.0
NPK						
Less than 150 kg	24	30.8				
150-250 kg	8	10.2				
300-600 kg	19	24.4				
800-1850 kg	18	23.1				
2000-5000 kg	5	6.4				
Over 5000 kg	4	5.1				
TOTAL	78	100.0				

Source: Compiled from data provided by SAED, 1984.

Annex Table 18. Differences Between Requested and Received Fertilizer Quantities, GP level, Fleuve, 1984.

	Delta		Middle Valley		Total Sample	
	Number	Percent	Number	Percent	Number	Percent
Urea						
No known request a/	6	30	4	23.5	10	27.0
Rec'd < 1/2 request	1	5	--	--	1	2.7
Rec'd = 1/2 request	1	5	--	--	1	2.7
Rec'd > 1/2 request	--	--	1	5.9	1	2.7
Received=requested	5	25	9	52.9	14	37.9
Rec'd > request b/	1	5	--	--	1	2.7
No reception yet c/	6	30	3	17.7	9	24.3
TOTAL	20	100	17	100.0	37	100.0
NPK						
No known request a/	9	45	7	41.2	16	43.3
Rec'd < 1/2 request	1	5	--	--	1	2.7
Rec'd = 1/2 request	2	10	--	--	2	5.4
Rec'd > 1/2 request	--	--	--	--	--	--
Received=requested	--	--	9	52.9	9	24.3
Rec'd > request b/	1	5	--	--	1	2.7
No reception yet c/	7	35	1	5.9	8	21.6
TOTAL	20	100	17	100.0	37	100.0

Source: Field survey data, 1984.

a/ At the time of the survey, some farmer groups in the Delta had not finalized discussions on modification of fertilizer requests.

b/ To be viewed with skepticism; the requested quantity may be incorrect.

c/ Some groups were interviewed before distribution had started in their area.

Annex Table 19. Frequency Distribution and Average Size of Irrigated Area per Farm, Fleuve, 1984.

	D E L T A			MIDDLE VALLEY		
Area (ha)[a/]	Number	Percent	Cumulative Percent	Number	Percent	Cumul. Percent
0.01 - 0.24	_	_	0.0	31	45.6	45.6
0.25 - 0.49	3	4.1	4.1	32	47.0	92.6
0.50 - 0.99	18	24.7	28.8	3	4.5	97.1
1.00 - 1.49	23	31.5	60.3	2	2.9	100.0
1.50 - 1.99	4	5.5	65.8	_	_	_
2.00 - 2.99	13	17.8	83.6	_	_	_
3.00 - 3.99	9	12.3	95.9	_	_	_
Over 4.00	3	4.1	100.0	_	_	_
TOTAL	73[b/]	100.0	100.0	68	100.0	100.0
AVERAGE AREA	**1.70 ha (std. dev. = 1.18)**			**0.31 ha (std. dev. = 0.20)**		

Source: Survey data, 1984.

[a/] Farmers generally know their exact parcel areas, or the areas are available from SAED documents.

[b/] Four missing values were omitted from the analysis.

Annex Table 20. Distribution of Membership Size of Producers Groups, Fleuve, 1984.

Delta			Middle Valley		
Number of Members	Number	Percent	Number of Members	Number	Percent
10 or less	3	16.7	30-40	2	11.7
11 - 20	7	38.9	51-60	4	23.5
21 - 30	4	22.2	71-80	3	17.7
41 - 50	2	11.1	81-90	4	23.5
51 - 53	2	11.1	101-200	3	17.7
			over 300	1	5.9
TOTAL	18	100.0		17	100.0
Statistics on Membership Size					
Mean	24.0		93.2		
Median	17		79		
Std. Dev.	15.3		68.5		

Source: Field survey data, 1984.

Annex Table 21. Impact of New Price Levels on Fertilizer Quantities Taken at the GP level, Fleuve, 1984.

	DELTA			MIDDLE VALLEY		
	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent
UREA (Utilization)						
Refusal	--	--	--	1	5.9	5.9
Reduction[a/]	14	70	70	9	52.9	58.8
Same use level	6	30	100	5	29.4	88.2
Increased use	--	--		2	11.8	100.0
TOTAL	20	100	100	17	100.0	100.0
NPK (Utilization)						
Refusal	4	20	20	6	35.3	35.3
Reduction[a/]	8	40	60	6	35.3	70.6
Same use level	8 [b/]	40	100	4	23.5	94.1
Increased use	--	--		1	5.9	100.0
TOTAL	20	100	100	17	100.0	100.0

Source: Field survey data, 1984.

[a/] All comparisons are with respect to last year's use levels.

[b/] A 50 kg limit was imposed because of insufficient availability at Boundoum. It is hard to predict how GP leaders would have reacted if supply had covered the usual 100 kg/ha dose; however, no reduction in urea use was observed at Boundoum. Boundoum GP leaders were added to the "same use" category since it is felt that they would not have reduced NPK quantity if sufficient amounts would have been available.

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