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CONTRACT FARMING
IN THE
HORTICULTURAL SECTOR
IN SENEGAL

Contract Farming in Africa Project

by

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IDA Working Paper No. 85

Contract Farming in Africa Project
Working Paper No. 13

April, 1988

Prepared for the research project, Contract Farming in Africa,
funded by the Africa Bureau, AID, and carried out by the
Clark University/Institute for Development Anthropology
Cooperative Agreement on Settlement and Resource Systems Analysis

This paper is published by the Institute for Development Anthropology and reports on work supported by Human Settlement and Natural Resources Systems Analysis (SARSA) Cooperative Agreement No. DAN 1135-A-00-4068-00, at Clark University and the Institute for Development Anthropology, funded by the U.S. Agency for International Development, Office of Rural and Institutional Development, Bureau for Science and Technology, Division of Rural and Regional Development. The views and interpretations in this publication are those of the author and should not be attributed to the Agency for International Development or to any individual acting on its behalf.

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I. INTRODUCTION

Contract farming is an institutional arrangement between farmers and buyers in which farmers supply produce according to specified production and management methods while buyers retain responsibility for marketing operations and technical assistance in production.

Contract farming is often seen as an intermediate institution between the spot market system and vertical integration. When spot markets fail to provide adequate signals on complex supply and demand conditions, vertical coordination may be used to integrate production and marketing. Contract farming may have advantages over vertical coordination. Under a set of circumstances, the contracting company may be able to obtain the desired quantity and quality of supplies it seeks without investing in land or farm management operations.

A number of farm commodities such as vegetables, poultry, beef, hogs and grains have been produced under contract in North America and Western Europe. In developing countries, contract farming has played an increasingly important role, particularly in Latin America and Asia. In Africa, several contract farming schemes have covered a wide array of agricultural commodities

including palm oil, rubber, sugar, tea, coffee, tobacco, poultry and horticultural crops.

Research on contract farming in developing countries has evolved around two distinct and often conflicting views. One approach perceives the institution as an instrument by which agribusiness and large companies transfer production risks to farmers and appropriate the gains from their efforts. For proponents, contract farming should lead the way to agricultural modernization. Few of these studies have analyzed contract farming in light of both its limitations and potential benefits to producers as well as the contracting firm.

Three weaknesses are particularly apparent in these studies. First, few proponents and critics have acknowledged the wide variations of contract farming schemes. Generalized judgements were instead made irrespective of marked differences in commodity characteristics and the economic environment. This limitation is a result of observers' failure to perceive the contract farming system as a set of endogenous institutions which evolve in response to a specific set of exogenous physical and socioeconomic conditions. Neglecting to relate the characteristics of individual schemes to their underlying conditions including characteristics of the commodity studied, farm technology, producers, the contracting company, consumers and the overall environment will continue to prevent a fuller

understanding of the contract farming institution. A second limitation of the contract farming literature lies in its tendency to neglect schemes which do not have considerable government backing. Little attention has, for instance, been paid to contract schemes involving small-scale producers. The third weakness stems from heavy reliance on secondary sources and individual perceptions at the expense of more representative data collection methods.

This report is intended to fill a gap in the contract farming literature. Its purpose is to analyze a private, less formal smallholder contract farming scheme using data collected through extensive interviews with participant farmers. Horticultural production in Senegal was selected as a basis for this investigation.

Several considerations dictated this choice: This report is part of a wider USAID-financed study on contract farming in sub-Saharan Africa. Among sub-Saharan African countries, Senegal has a large and dynamic horticultural sector that covers both the domestic and the export markets. This sector has a number of well-established contract farming programs. Contracting in these programs involves extensive participation of a variety of private companies and small-scale producers.

Contract production of fruits and vegetables is carried out in Senegal mainly for export. Farming under contract started in the early 1970s when Bud-Senegal¹ initiated a massive export project. Today, the twelve companies exporting fresh fruits and vegetables rely upon contract farming for their supplies.

Only 12 percent of all fresh produce exports are provided through noncontract estate growers. The remaining 88 percent are produced through contracts between exporters and local farmers. Among these, smallholders account for the bulk (more than 70 percent) of current production.²

Green beans were selected for this study because of their predominance in the Senegalese horticultural export sector. Senegal exports other commodities such as tomatoes, pepper, okra, eggplant, melon and mangos (see Table 1). However, vegetables account for more than 80 percent of all exports, and green beans represent approximately 70 percent of these vegetables.

The following methodology was used to collect the data needed for this study: An exhaustive list of farmers operating

¹A large-scale horticultural production scheme initiated by House of Bud, a European affiliate of Bud Antle, Inc. of Salinas, California.

²John S. Horton. "Characteristics of the Horticultural Export Enterprises Utilizing Contract Farming Schemes in Senegal." Draft report. Institute for Development Anthropology: Binghamton, New York, 1987.

Table 1. Distribution of Senegalese Exports of Fruits and Vegetables (1985-1986)

Produce	Percent
Vegetables	81.44
Green beans	69.17
Other vegetables	12.27
Tomatoes	2.89
Pepper	2.89
Eggplant	9.31
Okra	0.11
Fruits	18.56
Melon	18.27
Mangos	0.21

Source: computations using Table 1 in J. Horton: "Characteristics of the Horticultural Export Enterprises Utilizing Contract Farming Schemes in Senegal"

in selected areas of the Niayes, where contract farming is most prevalent, was established with the cooperation of extension agents assigned to the region by the Ministry of Agriculture. The list contained information on crops cultivated, contract crops, size of holding, and farming status (i.e., whether a particular farmer participated in a contract farming scheme).

The list showed the following pattern:

1. Green beans were, as expected, by far the crop most widely cultivated under contract.
2. This crop was, with very few exceptions, cultivated only under contract. Local consumption of green beans being very low, the harvest was sold almost exclusively to exporters.
3. Onions were cultivated by virtually all farmers in the region.

The initial list was, therefore, divided into green bean growers and other producers. Two random samples were then drawn from the two lists to represent the two separate groups. Out of the 218 farmers selected, 87 were contract farmers. The sample sizes were determined according to the variability in farm size, and using a 95 percent confidence interval and an error margin of 10 percent.

Data pertaining to the two groups were collected through personal interviews. These interviews were conducted in October 1987, under the author's supervision, by eight enumerators who were hired to complete a questionnaire designed for this purpose.³

The report is organized in eight chapters including the introduction. Chapter II presents a rationale for the emergence of contract farming in green bean production. Chapter III investigates the profitability of this enterprise. Reasons for producing under contract are discussed in Chapter IV. That chapter is followed by an examination of the nature and durability of the contract. Critics have claimed that contracting excludes small-scale producers and causes participant farmers to contract large debts with their clients. These allegations are explored in Chapter VI. The impact of contract farming on income distribution is examined in chapter VII. Chapter VIII presents the major variables associated with farmers' participation. The main findings of the study are summarized in the closing chapter.

³A copy of the questionnaire is provided as an annex to this report.

II. SPOT MARKET IMPERFECTIONS

Neo-classical economists define perfect competition as a model based on four assumptions. These assumptions are:

1. Complete freedom of entry and exit in the market by both sellers and buyers. Barriers to entry include financial restrictions that may bar an average market agent from participation as a seller of the commodity.

2. All buyers and sellers are small relative to the size of the market.

3. Homogeneity of the product; that is, all units of the product for which a market exists are identical and there is no advantage for a buyer to choose between sellers.

4. All economic units possess perfect information or knowledge concerning the market for the commodity in question.

In a perfectly competitive market, resource allocation is determined by the forces of supply and demand. These forces define the (spot) prices at which the commodity is most efficiently exchanged. Spot markets are less effective in

coordinating supply and demand when one or more of these assumptions are violated.

Contract farming in the production and marketing of green beans in Senegal is an institutional response to the imperfectly competitive nature of the market for this commodity. Even though there is an adequate number of green bean exporters and a large number of farmers producing the commodity, the spot price mechanism fails to coordinate supply and demand effectively in many ways. Green beans are perishable and can be kept for a maximum period of three days at considerable cost in refrigerated storage; yet they must be exported according to a specific schedule during a "market window" when supplies in foreign markets are short. Senegalese exporters' dependence on air freight and the limited air freight space available to them are additional constraints to this schedule. In effect, sea freight is just recently being considered by horticultural exporters. Meanwhile, the air freight opportunity has become increasingly saturated. Space available to fresh produce exporters is limited by quotas allocated by the Air Freight Committee to each exporter. These ceilings were imposed on traders because many of them had failed to deliver promised quantities of freight. Punitive rules for booked cargo space cancellation are currently being considered as an alternative to the stringent quota system. However, the new policy will exacerbate exporters' difficulties in dealing with timeliness of supply.

Much time and knowledge of market conditions are required by sellers and buyers for efficient marketing. Identification of contract growers provides vital information to exporters on both availability and timing of supplies. Identification of exporters is even more important to farmers. Details on future demand with regard to product quantity and peak periods are difficult to obtain, particularly in the absence of a significant local market for the commodity. Consumption of green beans in Senegal is primarily a residual flow of the export market. Marketing for both the export and local markets is undertaken simultaneously by only one local company.⁴ Not surprisingly, this company operates the only vertical scheme integrating a large horticultural estate to its grocery stores in Dakar. Otherwise local demand absorbs only déchêt or lower-quality produce rejected by exporters.

Farmers' decisions as to how much to produce and when to sell are made more complex by the specific requirements that buyers have on crop variety and quality. Imperfections in the local input and credit markets, and farmers' insufficient financial resources are other important sources of spot market inefficiencies.

⁴The Société Africaine industrielle et agricole de Sebikotane (SAFINA).

III. THE MICROECONOMICS OF CONTRACT FARMING

Profit maximization is the most common assumption used in economic theory to analyze farmers' decisions regarding what and how much to produce. Using this framework, profitability would be the primary factor determining farmers' adoption of the contract farming scheme. A straightforward method that can be used to compare profitability in the traditional and contract farming sectors is to compare net revenue obtained by farmers from cultivating the same commodity on the same unit of land under the two regimes. However, as explained above, the commodity selected for analysis in this study is cultivated almost exclusively under contract. An alternative method is to compare the commodity produced under contract with another crop produced by most traditional farmers in the region of study.

Tables 2-5 present a detailed description of input requirements and costs per hectare (ha) cultivated in green beans and onions. Tables 6-7 summarize profitability of both crops. It is clear from these tables that net revenue from the traditional crop is unambiguously higher than that derived from the export crop. The comparison suggests that profitability is not the primary factor determining farmers' adoption of the contract farming institution and that other determinants must be sought to explain their decisions.

Table 2. Average Labor Requirement and Costs per Hectare: Onions

Farming Operation	Period	Manday	Wage rate or inputed labor cost (CFA)	Tot. cost (CFA)
Land preparation	Nov.	50	800	40000
Organic & chemical fertilizer application	Nov. & Dec.-Jan.	40	800	32000
Planting (nursery & transplanting)	Sep.-Oct & Nov.	65	800	52000
Irrigation	Nov.-Feb.	260	800	208000
Weeding	Dec.-Feb.	80	800	64000
Harvesting	Feb.	50	800	40000
Total				436000

Source: Survey

Table 3. Average Labor Requirement and Costs per Hectare: Green Beans

Farming Operation	Period	Manday	Wage rate or inputed labor cost (CFA)	Tot. cost (CFA)
Land preparation	Oct.	50	800	40000
Organic & chemical fertilizer application	Oct.-Nov.	35	800	28000
Sowing	Oct.	30	800	24000
Irrigation	Oct.-Dec.	235	800	188000
Weeding	Nov.-Dec.	50	800	40000
Harvesting	Dec.	60	800	48000
Total				368000

Source: Survey

Table 4. Input Costs Other than Labor: Onions

Input	Amount	Unit Price (CFA)	Cost (CFA)
Organic Fertilizer	10 tons	5000	50000
Chemical Fertilizer	600 kg	90	54000
Seed	4 kg	12200	48800
Other Chemicals			
Liquid	5 liters	2500	12500
Powder	5 kg	600	3000
Total			168300

Source: Survey

Table 5. Input Costs Other than Labor: Green Beans

Input	Amount	Unit Price (CFA)	Cost (CFA)
Organic Fertilizer	7 tons	5000	35000
Chemical Fertilizer	450 kg	90	40500
Seed	50 kg	1000	50000
Other Chemicals			
Liquid	6 liters	2500	15000
Powder	7 kg	600	4200
Total			144700

Source: Survey

Table 6. Average Gross Revenue/ha: Onions & Green Beans

	Yield		Price		Gross Revenue
	Export Quality	Lower Quality	Export Quality	Lower Quality	
	ton		CFA/kg		CFA thousand
Onions	13	0.6	150	50	1980
Green Beans	7	0.5	140	40	1000

Source: Survey

Table 7. Average Net Revenue/ha: Onions & Green beans

	Labor Cost	Other Input Cost	Total Cost	Gross Revenue	Net Revenue Season	Net Revenue Year(*)
	----- CFA thousand -----					
Onions	436	144.7	580.7	1980	1393.3	1393.3
Green Beans	372	168.3	540.3	1000	459.7	919.4

(*) Two green bean crops can be cultivated in a one-year period

Source: Survey

IV. INCENTIVES FOR CONTRACTING

Six reasons were suggested to the farmers interviewed to elicit these incentives (Table 8). As the table indicates, only four of the reasons suggested were relevant. Contract farmers appear to be motivated by assurance of a market, availability of inputs, availability of credit and, to a lesser extent, better extension services.

Assurance of a market as a primary determinant of growers' participation demonstrates farmers' willingness to trade off higher income for security. Fulfillment of the need for cash on a more regular basis is facilitated by the possibility of producing two green bean crops in a single year.

Cash credit and credit in kind in the form of inputs provided by exporters at the beginning of the crop season are cited by all contract farmers as an incentive for participation. Even though only one-quarter of contract farmers obtain cash credit from exporters, credit in kind is available to all participants (Table 9). By contrast, only 5 percent of noncontract farmers have access to credit in kind from all sources. This proportion is even lower for cash credit. Seed, insecticides and pesticides, and fertilizer are obtained on credit terms by 87, 72 and 19 percent of contract farmers respectively (Table 10).

Table 8. Reasons for Participation in a Contract Farming Scheme

Reason	Respondents	
	Number	Percent
I am a contract farmer because:		
1. Inputs are difficult to obtain otherwise	43	54
2. Credit is difficult to obtain otherwise	39	49
3. It is difficult to rent agricultural machinery otherwise	0	0
4. I have access to the company's irrigation infrastructure	0	0
5. I have an assured market for the crop	55	70
6. I have access to the company's extension services	15	19

Source: Survey

Table 9. Credit in Kind, by Source: Contract & Non-contract Farmers

Source	Contract Farmers		Non-contract Farmers	
	Number	Percent	Number	Percent
Family member	2	2.5	4	2.9
Agricultural bank	0	0	1	0.7
Exporter	79	100	0	0
Other trader	0	0	2	1.4
All sources	79	100	7	5

Source: Survey

Table 10. Cash Credit, by Source: Contract & Non-contract Farmers

Source	Contract Farmers		Non-contract Farmers	
	Number	Percent	Number	Percent
Family member	2	2.5	0	0
Agricultural bank	0	0	1	0.7
Exporter	19	24	0	0
Other trader	0	0	2	1.4
All sources	21	26.5	3	2.1

Source: Survey

Table 11. Credit in Kind, by Type: Contract Farmers

Input Quantity (percent)	Farmers Obtaining					
	Fertilizer		Chemicals		Seed	
	Number	Percent	Number	Percent	Number	Percent
100	12	15	35	44	55	70
More than 50	16	19	55	70	69	87
Less than 50	0	0	2	3	0	0
Total	16	19	57	72	69	87

Source: Survey

Table 12. Credit in Kind, by Type: Non-contract Farmers

Input Quantity (percent)	Farmers Obtaining					
	Fertilizer		Chemicals		Seed	
	Number	Percent	Number	Percent	Number	Percent
100	3	2	0	0	2	1.4
More than 50	0	0	0	0	0	0
Less than 50	0	0	1	0.7	0	0
Total	3	<u>2</u>	1	<u>0.7</u>	2	<u>1.4</u>

Source: Survey

Credit by the type of input obtained by contract farmers is detailed in table 11. The higher percentage of farmers obtaining seed from exporters is explained by exporters' need to acquire the appropriate crop variety from growers. A large number of farmers have ready access to pesticides and insecticides because these chemicals are required to obtain high-quality produce. Cash credit and fertilizer are provided on a more limited basis. Being a fungible good, cash can be diverted to other more lucrative crops or simply used by recipients to pay household expenses. Since fertilizer is not a crop specific input, it tends to be diverted to more lucrative uses or otherwise converted into cash.

V. NATURE AND DURABILITY OF THE CONTRACT

The contractual arrangement between farmers and exporters appears to be a durable relationship. In effect, more than 60 percent of contract farmers have been farming under contract for at least five years (Table 13 below). One out of five farmers has shifted from one exporter to another, but only 13 percent

 Table 13. Period of Participation in Contract Farming

Period*	Farmers	
	<u>Number</u>	<u>Percentage</u>
10 or more	12	15.2
5-10	38	48.1
less than 5	29	36.7

*Average period = 7 years

of noncontract growers were initially contract farmers. Moreover, eight of these farmers consider their withdrawal only temporary. Noncontract farmers reported a consistent eagerness to produce under contract. Farmers not willing to participate amount to less than 6 percent of total noncontract farmers interviewed.

The reasons explaining farmers' dissatisfaction with contract farming are summarized in Table 14. Three main results can be obtained from this table. First, the technology associated with contract farming is generally well-known to farmers and does not represent a reason for nonparticipation.

Second, despite farmers willingness to trade higher income for security, output price level and stability remain an important determinant in the growers' relationship with exporters. Crop prices are not fixed at planting time; instead, exporters pay the market price at the time of delivery. This outcome is, at first glance, surprising. In effect, exporters have, through the contractual arrangement, ample information on domestic supply conditions. Foreign demand for green beans has been stable and prices in Europe have not fluctuated markedly in recent years. Credit arrangements with European importers provide exporters with additional indications on the level of foreign demand. However, informal interviews with exporters indicate that prices are not negotiated with farmers at planting time because of growers' inability to deliver a homogeneous product. This is in turn due to exporters' lack of resources to exercise constant supervision on the production process.

Third, credit is the primary consideration in the relationship between horticultural contract producers and

Table 14. Reasons for Dissatisfaction with Contract Farming

Reason	Type of Farmers	
	Farmers shifting to other exporters	Farmers withdraw- ing from contract production
	----- Percent -----	
1. Insufficient credit	100	95
2. Exporter does not buy the entire harvest at the same price, clai- ming that part of the produce is of a lower quality	86	46
3. Low output prices	79	35
4. too complicated pro- duction techniques	0	2

Source: Survey

the export company (see below). This result is consistent with the reasons cited by farmers for entering the contractual arrangement (see Table 8).

Thus, contract farming in the horticultural sector in Senegal is an institutional response to imperfections in the spot-market and credit systems. By providing inaccessible information on demand conditions, this institutional arrangement induces growers to produce a commodity for which few domestic outlets exist. Local horticultural growers are small-scale producers with limited financial resources. The great majority of these farmers are unable to mobilize larger operating capital through formal credit channels either because there are no credit programs available to them or because the transaction costs of obtaining a loan are high relative to the size of the loan. Cash or inputs supplied through credit, with their value explicitly subtracted from the crop payment made by the export company, provide an alternative arrangement to the farmer.

VI. TWO CONTROVERSIES: FARMERS' INDEBTEDNESS AND LARGE-SCALE VS. SMALL-SCALE PRODUCERS

In view of the importance of credit in the relationship between farmers and exporters, can farmers be overburdened by debt and be locked into a deteriorating situation? The case study analyzed here provides an unambiguously negative answer to this question for a number of reasons:

First, farmers are able to terminate the contract when the expected benefits do not materialize. As mentioned above, 13 percent of noncontract producers interviewed were initially farming under contract.

Second, 20 percent of dissatisfied contract farmers were able to shift to new exporters. These alternative outlets are indicative of the existence of sufficient competition among exporters.

Third, farmers in the area are not made more vulnerable by crop specialization and, therefore, more dependent on contract farming. Since demand for the contract crop is limited by the size of the export market and air freight capacity, only one-third of total land cultivated by contract producers is devoted to contract crops. Moreover, suitability of the soil to

a variety of horticultural crops enables farmers to alter the optimal enterprise combination at the beginning of any season.

Fourth, contracts are generally informal and the few written contracts are not easily enforceable. Since most defendants have limited means to make a settlement if the verdict is against them, recourse to legal action following violation of contract is an exceptional occurrence. Consequently, loan levels are designed by exporters to discourage opportunistic behavior by farmers. Cash credit is provided to less than 25 percent of contract growers and averages less than 8 percent of net returns per ha. Credit in kind covers input needs only partially for most contract farmers.

Critics of contract farming allege that private outgrower schemes have limited value as instruments of development because they exclude small-scale farmers. To explore this controversy, data on farm size distribution were collected. These data are summarized in Table 15. This table shows that the average landholding is 5.7 ha and 4 ha for contract and noncontract farmers respectively. This size differential is indicative of exporters' preference to contract with larger-scale producers: dealing with a multitude of smaller-scale operators would entail higher risks of default or necessitate a greater managerial capacity that an average exporter may not have. However, the drawbacks from exporters' preference for large-scale farmers are

Table 15. Average Landholding Distribution: Contract vs. Non-contract Farmers

	Contract Farmers	Non-contract Farmers
	----- Hectare -----	
Total landholding	5.7	4
Fallow land	2	1.5
Total area cultivated	3.7	2.5
Contract farming area	1.2	0
Non-contract farming area	2.5	2.5

Source: Survey

limited by the nature of horticultural farming in the region. Larger farmers must rely on mechanized land preparation techniques and diesel pumping of water for irrigation. In the absence of an adequate credit system, this technology necessitates the mobilization of investment and operating capital levels beyond farmers' means. Due to the limited use of a labor-reducing technology, horticultural production in the area is highly labor-intensive. In addition, farmers rely on family labor for most tasks. Heavy reliance on family labor enables farmers to avoid both the search for scarce salaried labor and the cost of labor shirking. Moreover, paying a salary on a regular basis to a hired worker is in most cases beyond farmers' limited financial resources.

These technological and institutional factors discourage the emergence of large-scale farming, thereby limiting exporters' range of choice. This choice is further constrained by the fact that the area under contract is, without exception, only a proportion (approximately 30 percent) of total area cultivated.

To reduce the supervision and other transaction costs related to finding many small farmers and furnishing them with contracts, inputs and technical assistance, exporters do not contract directly with individual producers. Growers are, instead, asked to group together. A Chef de groupement or Chef de secteur is selected to serve as the intermediary between the

exporter and the farmers. The Grouping Representative is typically a grower or trader who earns a commission paid by exporters for his recruiting and coordinating services.

Contracting with small farmers through the Grouping Representative has a dual function. First, it enables exporters to circumvent the prohibitive costs of accounting for all the inputs and outputs of each grower. Second, in the event of default exporters have no leverage on farmers to recuperate their losses. Recruiting through the Grouping Representative, who must show judgement in choosing growers, reduces the risk of abuse associated with contracting with a multitude of small farmers.

VII. INCOME DISTRIBUTION

Further examination of Table 15 shows that the difference between contract and noncontract farmers with respect to farm size is even less significant than the average landholding of 5.7 ha and 4 ha indicates. Subtracting fallow land area from both figures reduces these figures to 3.7 and 2.5 ha, for a difference of 1.2 ha. This difference is exactly equal to the area cultivated under contract.

This land distribution pattern suggests that cash income earned by contract farmers must be higher than that earned by noncontract farmers by an amount equal to the income derived from the difference in area cultivated. However, investigation of income distribution between the two groups reveals that 38 percent of noncontract farmers and only 14 percent of contract producers are engaged in activities off the farm, suggesting that the disadvantage resulting from smaller farm size is offset by income earned from nonfarm activities. Comparison of farmers' standards of living demonstrates that this is indeed the case. In effect, examination of selected standards-of-living indicators (Table 16) reveals that none of the two groups is significantly better off than the other group.

The income distribution pattern outlined above indicates that horticultural farmers in Senegal, whether producing

Table 16. Selected Standards-of-living Indicators: Contract vs. Non-contract Farmers

	Contract Farmers	Non-contract Farmers
	----- Percent -----	
Ownership of:		
Range	8	15
Fan	3	1
Radio	72	65
Television	0	2
Sowing machine	3	1
House with:		
Permanent walls	52	54
Permanent roof	51	48
Electricity	1	2

Source: Survey

independently or under contract, are not subsistence farmers. The sample interviewed shows that the farm provides 57 percent of household food consumption needs for the first group and 59 percent for the second group, suggesting that this proportion is not significantly affected by farm size or its corollary effect on farming status. Even though the ratio of subsistence to commercial crop production is higher for noncontract farmers due to farm size differentials, both contract and noncontract farmers earn cash income to meet other food and nonfood needs.

VIII. VARIABLES ASSOCIATED WITH PARTICIPATION

Cash income is earned from three sources: contract crops, other commercial crops, and off-farm activities. Commercial farming excluding contract crops is undertaken by all horticultural farmers in the region. The choice between contract farming and off-farm activities as an additional source of income appears to be dictated by household size and availability of full-time family labor. Not only are households in the contract farming group larger (9 members compared to 7 for noncontract farmers), but more of their members are full-time workers (5 and 3 respectively). Considering that part-time family labor is the same for both groups (approximately 1.5 part-time workers per household on average), availability of additional full-time family workers appears to be a primary determinant of farmers participation in contract farming. As explained earlier, choice of off-farm activities over expansion of farm size may be more attractive to nonparticipants because they cannot afford the cost of using hired labor and/or because hired labor is less reliable, particularly for tasks that require special skills (e.g., management and application of fertilizers and other chemicals).

Other determinants include farmer's age, years of farming experience, and availability of extension services. As can be seen in Table 17, these variables are positively correlated with

Table 17. Age, Years of Farming Experience & Source of Information: Contract & Non-contract Farmers

	Contract Farmers	Non-contract Farmers
	----- Years -----	
Age	45	38
Farming experience	33	27
	----- Percent -----	
Source of information		
Family member	25	28
Neighbor	48	57
Extention agent	86	34
Grouping Representative	19	0

Source: Survey

adoption. Age and years of farming experience are associated with knowledge of repertoire and, consequently, a higher degree of specialization in farming. Extension services play a similar role by improving agricultural practices or enhancing knowledge of new farming techniques.

Exporters point out that research projects conducted by the National Institute of Horticulture in Dakar lack the capabilities to yield specific and timely results of interest to nontraditional farmers. They also describe government extension personnel as too few and inadequately trained to deal with farmers' difficulties in producing high-quality vegetables for export. Table 17 indicates, however, that, despite its deficiencies, the public extension network plays a major role in stimulating adoption of contract crops.

Even though the Chef de groupement or Grouping Representative does not act primarily as an extension agent, he serves as the titular contractor and is, as a consequence, responsible for the collective performance of the contract producers under his supervision. As attested in Table 15, this role entails a certain degree of involvement in technical assistance activities, at least by interacting with farmers to keep them abreast of quality requirements or changes in preference in the market.

IX. SUMMARY AND CONCLUSION

Contract production of green beans in Senegal is an institutional response to imperfections in the spot market prices for this produce. This institutional innovation pools knowledge of buyers and sellers regarding supply and demand conditions that the spot market mechanism fails to provide. Green beans are produced almost exclusively for export. The commodity must be shipped according to a specific schedule. Scheduling is made more complex by exporters' dependence on air freight and the quota system imposed by airline companies. Information on both availability and timing of supplies is inaccessible to buyers. Details on demand conditions available to sellers are equally limited. The specific requirements that the export market has on crop variety and quality render farmers' production decisions even more intricate. Imperfections in the credit and input markets are additional sources of spot market inefficiency.

Farm-level data demonstrate that the contract crop is much less profitable than the traditional crop most widely cultivated in the area. Net revenue forgone is, however, compensated by a more secure income resulting from an assured market for the contract crop. Other important incentives include access to credit and inputs that would be otherwise difficult to obtain from traditional channels.

Importers forward inputs and make cash advances that will be deducted from crop payments. This credit arrangement does not, however, run client farmers into a deteriorating debt situation. Since contracts are generally informal and not easily enforceable, credit levels are kept sufficiently low to discourage opportunistic behavior by participant farmers. Suitability of the soil to a variety of horticultural production further reduces farmers' dependence on contract crops and their vulnerability to debt accumulation.

Critics of contract farming allege that private outgrower schemes exacerbate income disparities in rural areas because they exclude small-scale producers. These critics argue that the company tends to deal exclusively with large operators to avoid the transaction costs of contracting with a large number of small-size farmers. The case study analyzed in this report indicates that this is not a necessary outcome. Institutional innovations may emerge to equate the transaction costs of contracting with smallholders to those incurred in dealing with larger producers. The Chef de secteur or Grouping Representative is an example of such innovations. By serving as intermediaries between individual growers and the contracting company, Grouping Representatives reduce transaction costs in two ways: they save the contracting company as well as the farmer time and other resources that would be required to search for and negotiate with a potential partner. By selecting only those producers who

satisfy certain criteria, grouping representatives reduce the incidence of opportunistic behavior.

Proponents and critics have competed in showing the beneficial or adverse effects of contract production on local farmers. Examination of selected standards-of-living indicators reveals that none of the two groups of participants and nonparticipants is significantly better off than the other group: additional income earned from contract crops is offset by nonparticipants' higher propensity to engage in nonfarm activities to supplement farm income.

Participation in contract farming is influenced by household size and greater availability of full-time family workers, farmers' age and years of farming experience, and availability of extension services. Larger households possessing more full-time workers and headed by older farmers with an extensive farming experience are more likely to participate. Availability of extension services is positively correlated with adoption because these services improve participants' knowledge of the new farming techniques associated with contract production.

The above analysis suggests that contract farming is a production and marketing arrangement used by market agents when the price mechanism does not ensure effective coordination of supply and demand. Contract farming may be more effective in

coordinating the market for selected export and processed commodities, but is unlikely to be used in the production of basic food crops for which an adequate domestic market exists and/or for which quality and timing of supplies are less important to buyers. For this reason, contract farming should not be viewed as a key to improved food security or a substitute for investment in agricultural research and extension, but rather as an enterprise that may provide an added range of positive contributions toward efficiency in selected markets.

Identification of these markets is not as straightforward as it seems. The complexity of the task stems from the fact that market structure and performance are endogenous products of the specific characteristics of the environment in which market agents operate. The variety of crops, farm sizes, credit and input market arrangements and government policies, as well as the dynamic nature of the production and marketing schemes underline the need for additional comparative analyses across countries and commodities. Such comparative research would provide a more reliable basis for identifying the requirements that contract farming systems must meet and specifying conditions under which these systems are more likely to be beneficial.

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*These references are limited to Senegal. For a detailed
bibliography on contract farming, see Nicholas W. Minot.
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ANNEX: QUESTIONNAIRE USED FOR DATA COLLECTION

QUESTIONNAIRE

Nom de l'enqueteur _____

Date de l'enquete _____

EXPLOITANT

Nom _____

Adresse _____

Age _____

Nombre d'annees en agriculture _____

Nombre d'annees sur cette exploitation _____

Niveau d'instruction _____

1. ne sait ni lire ni ecrire
2. sait lire seulement
3. sait lire et ecrire
4. etudes primaires
5. etudes secondaires 1er cycle
6. etudes secondaires 2eme cycle
7. etudes superieures

Appartenez-vous a une institution villageoise? (Oui=1; non=0) ___

Participez-vous a des reunions agricoles? (Oui=1; non=0) ___

Nombre de jours par an passes hors de l'exploitation _____

Activites renumerees hors de l'exploitation. (Oui=1; non=0) ___

Si oui, activites agricoles ou non-agr. (ag.=0; non ag=1) ___

Si l'activite est non agricole, genre _____

1. commerce
2. administration
3. autre (a preciser)

Distance separant votre exploitation du marche le plus
proche _____ km

Revenu acquis hors de l'exploitation par rapport au revenu
total _____ %

Avez-vous un contrat de production avec un exportateur? (oui=1; non=0) _____

Si oui, cela fait-il combien d'annees que vous produisez sous contrat? _____

Si oui, pourquoi produisez-vous sous contrat? (encercler les mentions utiles)

1. Je recois des intrants que je ne pourrai obtenir autrement
2. Je recois des credits que je ne pourrai obtenir autrement
3. Je loue chez la compagnie ou l'exportateur des machines agricoles qu'il m'est difficile de louer autrement
4. La compagnie m'offre acces a son infrastructure d'irrigation
5. J'ai un marche assure pour ma recolte
6. Je beneficie des conseils des vulgarisateurs agricoles de la compagnie ou de l'exportateur
7. autre (a preciser) _____

Avez-vous produit sous contrat et cesse de le faire? (Oui=1; non=0) _____

Si oui, raisons du changement (encercler les mentions utiles)

1. La compagnie (ou l'exportateur) promettait de me fournir intrants et credits mais ne realisait pas ses promesses
2. La compagnie (ou l'exportateur) achetait parfois une quantite limitee de ma recolte et refusait d'acheter le reste parcequ'elle le jugeait de moindre qualite
3. Le prix offert etait trop bas par rapport a ce que je pouvais obtenir ailleurs
4. Les methodes de production exigees par la compagnie (ou l'exportateur) etaient trop compliquees pour moi
5. Autre (a preciser) _____

Si l'exploitant ne produit pas sous contrat, ou vend-t-il ses produits? (encercler les mentions utiles)

1. Marche
2. Comercant local venant faire la collecte des produits sur la ferme
3. Autre (a preciser) _____

Si l'exploitant vend ses produit hors de la ferme, combien paie-t-il pour le transport? _____CFA par _____

Si l'exploitant ne produit pas sous contrat, raisons pour lesquelles il a choisi cette solution (encercler les mentions utiles)

1. Le prix offert est trop bas par rapport a ce que je peux obtenir ailleurs
2. Les methodes de production exigees par la compagnie sont trop compliquees pour moi
3. Je ne dispose pas d'assez de main d'oeuvre familiale qui me permettrait d'appliquer les methodes de production exigees par la compagnie
4. Malgre le contrat, la compagnie n'acheterait qu'une quantite limitee de ma recolte et refuserait d'acheter le reste sous pretexte qu'il est de moindre qualite ou que le marche exterieur n'est pas porteur
5. Je voudrais produire sous contrat mais j'attends que ma candidature soit acceptee
6. Autre (a preciser) _____

MENAGE EXPLOITANT

Age	Travail sur l'exploitation a plein temps (oui=1; non=0)	si a mi-temps combien d'heure par semaine?	Va-t-il (elle) a l'ecole? (oui=1; non=0)	Si non, niveau scolaire
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____

Consommation alimentaire du menage:

% cultive sur la ferme _____%

% achete sur le marche _____%

SUPERFICIE DE CULTURE (toutes cultures confondues)

Qualite	Superficie	*Mode de faire valoir	Si location, valeur	Si gerance, combien ete-vous paye?	Culture sous contrat (oui=1; non=0)	% Irrigue	Source
bonne terre	_____ ha	_____	_____ CFA	_____ CFA	_____	_____ %	_____
assez bonne terre	_____ ha	_____	_____ CFA	_____ CFA	_____	_____ %	_____
pas assez bonne terre	_____ ha	_____	_____ CFA	_____ CFA	_____	_____ %	_____
mauvaise terre	_____ ha	_____	_____ CFA	_____ CFA	_____	_____ %	_____

*propriete=1
 copropriete=2
 location (les terres vous sont louees) = 3
 gerance(organisation et gestion de l'exploitation vous sont confiees) = 4
 autre (a preciser)=5

Superficie en jachere _____ ha

Superficie des terres non-agricoles _____ ha

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RENDEMENT

Qualite du produit	Rendement obtenu	Prix obtenu	Rendement prevu
Export	_____ ton/ha	_____ CFA/kg	_____ ton/ha
Dechets	_____ ton/ha	_____ CFA/kg	_____ ton/ha

Si le rendement obtenu n'est le meme que le rendement prevu, comment expliquez-vous la difference? _____

1. climat
2. insuffisance d'eau
3. maladie
4. variete utilisee

ACTIVITES AGRICOLES

Activite	date	Main d'oeuvre		Fait par*	Mode							
		No. de personnes	duree		Si Atelier			Si Mecanique				
					1. manuel	2. atelier	3. mecanique	1. propriete	Si location cout par jour	1. propriete	Si location d'ou vient-il?	
Prep. du sol												
Semences												
Fertilisation												
Irrigation												
Prod. chimiques												
Sarclage												
Recolte												
Transport												
Autre (preciser)												

- *1. exploitant
- 2. membre de la famille
- 3. echange (entraide)
- 4. main d'oeuvre salaries (indiquer cout par jour)

INTRANTS (appliquees aux haricots verts ou aux oignons seulement)

Avez-vous utilise de l'engrais organique? (Oui=1; non=0) _____

Si oui, combien? _____ sur quelle superficie _____
cout _____

	Engrais	Semences	Desherbants	Insecticides
superficie	_____	_____	_____	_____
quantite	_____	_____	_____	_____
origine	_____	_____	_____	_____
1. marche	_____	_____	_____	_____
2. compagnie ou exportateur	_____	_____	_____	_____
2. autre (a preciser)	_____	_____	_____	_____
moyen d'achat	_____	_____	_____	_____
1. comptant	_____	_____	_____	_____
2. credit	_____	_____	_____	_____
3. echange avec d'autres paysans (don, pret, etc.)	_____	_____	_____	_____

Si comptant ou credit, cout _____

Cout d'irrigation _____ CFA

CREDITS AGRICOLES

Obtenez-vous des credits agricoles? (Oui=1; non=0) _____

Si oui, source (encercler les mentions utiles)

1. membre de la famille
2. banque agricole
3. compagnie (ou exportateur) a qui vous vendez vos produits
4. autre source (a preciser) _____

Si oui,

en liquide: montant _____

en nature:

engrais: tout _____ en partie _____ %

produits chimiques: tout _____ en partie _____ %

semences: tout _____ en partie _____ %

traction mecanique: tout _____ en partie _____ %

INFORMATION AGRICOLE

Avec qui discutez-vous vos problèmes agricoles? (encercler les mentions utiles)

1. membres de la famille
2. voisins
3. chef de groupement
4. agents de vulgarisation
5. autre (à préciser) _____

Fréquence des contacts faits par l'exploitant avec les services de vulgarisation agricole _____

MATERIEL AGRICOLE (en votre possession)

Type	Nombre
Tracteur	_____
Camionnette	_____
Animal de traction	_____
Houe	_____
Machette	_____
Hache	_____
Coupe-coupe	_____
Pelle	_____
Beche	_____
Arrosoir	_____
Charrue	_____
Charrette	_____
autres (à préciser)	_____
_____	_____
_____	_____

BIENS DE CONSOMMATION DURABLES (oui=1; non=0)

Machine a coudre _____

Refrigerateur _____

Four a gaz ou electrique _____

Ventilateur _____

Radio ou radio/cassette _____

Stereo _____

TV _____

Bicyclette _____

Mobylette _____

Voiture _____

Habitation avec
murs en materiaux durables _____
toit en materiaux durables _____
electricite _____

Combien de chambres avez-vous dans votre habitation? _____

BETAIL (en votre possession)

Type	Nombre
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____