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thesis entitled

ASUBSECTOR ANALYSIS OF THE IMPROVED BEAN MARKET IN HAITI

presented by

WILLIAM HARR SHIELDS

has been accepted towards fulfillment
of the requirements for

MS degree in AGRICULTURAL ECONOMICS

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Date 12/3/01

A SUBSECTOR ANALYSIS OF THE IMPROVED BEAN MARKET IN HAITI

By

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER'S OF SCIENCE

Department of Agricultural Economics

2001

ABSTRACT

A SUBSECTOR ANALYSIS OF THE IMPROVED BEAN MARKET IN HAITI

By

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Lack of farmer access to improved crop seeds is one of the chief constraints to increasing agricultural production in developing countries. In Haiti, one of the poorest countries in the world, a small but vibrant seed sector is slowly emerging from mostly informal partnerships between public, private, and non-governmental organizations to provide Haitian farmers with improved seeds.

This study describes the Haitian market for improved bean seed through a subsector analysis and observes actors' attempts to minimize their information-related transaction costs. These transaction costs are particularly high in Haiti because decades of economic and political turmoil have enervated the public institutions that would otherwise work to reduce them.

The study finds that this nascent seed industry relies upon linkages with international research organizations, social capital, and traditional farmer organizations to reduce information costs in the subsector. An unexpected finding is that even the poorest Haitian farmers have a strong seasonal demand for improved bean seed and are willing to pay a premium price for it. This result suggests that government-level institutional and policy reforms may further reduce information costs, help increase farmer adoption of improved beans, and enable the development of a strong private sector.

ACKNOWLEDGEMENTS

I commence these acknowledgements with a thank you to my major advisor, Dr. Richard H. Bernsten, for his guidance and encouragement throughout the past three years. Mere words cannot express how I have relied upon and benefited from his wisdom, dedication, and friendship during my tenure at Michigan State University. I also acknowledge the guidance and thoughtful comments of my thesis committee, Dr. Irvin E. Widders and Dr. John M. Staatz. Dr. A. Allan Schmid likewise deserves my heartfelt thanks for his contribution to the institutional analysis section of this study. I hope that he can recognize his influence!

This study was made possible by the generous support of the Bean/Cowpea CRSP office at Michigan State University, which funded my research and travel in Haiti over the summer of 2000 and a subsequent semester of study.

In Haiti, a special thanks to Emmanuel Prophète from the Haitian Ministry of Agriculture, Natural Resources, and Rural Development's Center for Agricultural Research and Development. His knowledge, logistical support, and tireless effort were incredible. I also thank Alfredo Mena Pantaleon, Lavael Eugène, and the wonderful staff at the Inter-American Institute for Agricultural Cooperation (IICA) for their logistical support in Port au Prince. Jean Lesky Dominique from the Inter-Sectoral Commission of Production and Distribution of Improved Seeds provided hours of assistance on the details of CIPDSA's operations. Likewise, a thank you to Eliassant Magloire and Mousson Finnigan of the Organization for the Rehabilitation of the Environment, and Jean-Philippe Eveillard of AgroTechnique for their information and advice.

A warm thank you to Jean-Robert Pasquette of AgroTechnique for providing transportation around Camp Perrin. Also a thank you to Gardy Horigène for tolerating my driving, providing the wonderful Creole translation of the survey, and enumerating the farmer survey. I also thank the staff at the Levy farm research station in Camp Perrin for their logistical support and fabulous cooking.

Finally, I thank my parents, Bruce and Carolyn Shields, for their unflinching support of my every effort. I dedicate this effort to my lovely wife, Iva Petrova, who watched with great trepidation last June as I departed for a summer in Haiti a bare three weeks after we exchanged wedding vows. Her unconditional support made it all possible.

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KEY TO ABBREVIATIONS

ALN ..... Arroyo Loro Negro

BGMV ..... Bean Golden Mosaic Virus

BIA ..... Agricultural Input Boutiques

CIAT ..... International Center for Tropical Agriculture

CIPDSA ..... Inter-Sectoral Commission of Production and Distribution of Improved Seeds

CRDA ..... Center for Agricultural Research and Development

CRSP ..... Bean/Cowpea Collaborative Research Support Program

DDA ..... Departmental Agriculture Directorates

EU ..... European Union

FAO ..... Food and Agriculture Organization

HTG ..... Haitian Gourde (HTG 20 = US $1)

MARNDR ..... Haitian Ministry of Agriculture, Natural Resources, and Rural Development

ORE ..... Organization for the Rehabilitation of the Environment

PNIS ..... National Input Program for Seed

PROFIJOL ..... Cooperative Regional Bean Program for Mexico, Central America, and the Caribbean

SNS ..... National Seed Service

UPSA ..... Artisanal Seed Production Unit

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

The history of agriculture chronicles mankind's remarkable success with increasing food production to meet the alimentary demands of growing human populations. Expanded food production has historically resulted from cropland extensification as well as modest advances in cultural techniques, tools, and plant genetics. Over the past 40 years, as the quantity of land available for agricultural extensification has dwindled, farmers have increased their reliance upon chemical fertilizers, pesticides, and better plant genetics to intensify agricultural production. Within the compass of technological change in agriculture, the continual enhancement of plant genetics, as embodied in the seed of improved varieties, remains the primary vehicle for moving new agricultural technology onto the farm.

Increasing farmer access to and adoption of improved varieties requires that farmers, traders, and private, public, and international organizations minimize the cost of acquiring, evaluating, and disseminating information about their respective activities. Thus, these actors affect market performance by structuring their relationships in ways that minimize transaction costs in the marketplace.

1.1.1 Evolving Role of Government

Historically, the Haitian government has not emphasized the development of staple food markets and their supporting structures, focusing instead on earning foreign exchange from export crops such as coffee, cocoa, and sugar. This long-standing focus on export industries began to change following the return of civilian government to Haiti in 1994 when international aid donors conditioned their renewal of financial support upon the enactment of widespread economic and social reforms.

Since 1994, advocates of two conflicting visions of the state's role in agricultural market reforms have competed for primacy within the Haitian government. Some in the government and major aid donors --such as the European Union, USAID, and the World Bank-- favor decentralization and withdrawal of the state from even minor roles in seed marketing activities. Supporters of this market liberalization wish to limit the role of the Haitian Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR) in the improved varieties market to one of supervision, administration of resource allocation, and general policy design. Proponents of the second, statist approach, cite difficulty coordinating activities among decentralized organizations and the need to define clear policy priorities as reasons to strengthen state control at all levels of the improved seed sector (Prophète, 2000), (Manigat, 1999). The November 2000 re-election of Jean-Berthrand Aristide is widely thought to strengthen the position of statists in the debate over the precise role of the state in agricultural reform.[1]

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[1] Recent events reinforce this view: The repaired Darbonne sugar plant will start to produce sugar under state ownership in early 2001. The government also plans to repair and run ENAOL, an edible oil processing plant. ENAOL previously closed due to low local supplies of soybean, cotton, and peanuts.

1.1.2 Challenge for Haitian Agriculture

To achieve national food self-sufficiency, each hectare of arable land in Haiti must support, on average, more than 14 people (FAO, 2001).[2] Currently, national production falls far short of this benchmark, providing an average of 59 percent of national caloric requirements, with commercial imports and food aid contributing 34 and 7 percent, respectively (Gagnon, 1998). According to the FAO, Haiti imported a total of 35,000 Mt. of dry beans in 1999 worth $16 million. Not surprisingly then, food purchases represent a major expense for both urban and rural Haitians. In urban and rural areas, food purchases represent 34 percent and 39 percent of total household budgets, respectively. These same purchases account for 93 percent and 76 percent of total food consumption in urban and rural areas, respectively (Jensen, et al., 1990a).

Haiti's rural food-purchasing patterns are similar to those in many other developing countries (Weber, et al., 1988).[3] Because even farm households in agricultural areas are net purchasers of food, government policies that artificially raise food prices above market levels as an incentive for farmers to increase production are inappropriate strategies for Haiti. Under these circumstances, price increases will increase rural poverty, even among farmers (Gagnon, 1998). Presently both urban and rural Haitians are food insecure; that is, they have insufficient access to the calories and protein to meet their daily nutritional needs throughout the year. The 1987 HECS[4] estimated that 49 percent of Haitian households consumed less than 75 percent of the

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[2] This compares with an average of only 1.6 people per hectare of arable land in the United States

[3] Several studies indicate that between 30 and 73 percent of rural African households are net buyers of coarse grains.

[4] The Haiti Household Expenditure and Consumption Survey (HECS) conducted by the Institut Haitien de Statistique et d'Informatique (IHSI) with support from USAID/Haiti.

recommended level of food energy available, and 37 percent of households consumed less than 75 percent of the recommended protein level (Jensen, et al., 1990b).

Thus, the only long-run solution for reducing rural poverty and malnutrition in Haiti is to raise farm income through agricultural intensification. Given the low productivity of Haitian agriculture, even modest gains in domestic production have the potential to affect positively the 65 percent of Haitians that inhabit rural areas. Increased access to and adoption of improved varieties is a vital component of any effort to intensify agricultural production.

1.1.3 Importance of Beans in Haiti

Beans play an important role in Haiti's rural economy and in the diet of urban and rural Haitians. Malnutrition is a direct consequence of poverty. In Haiti, beans are an affordable source of complementary amino acids for the poor, who typically receive most of their calories from cereals and tuber crops. Only a few food items provide most nutrition in the Haitian diet. Ranked by expenditure, the most important food items are rice, beans, cooking oil, green bananas, bread, and goat meat. Purchases of rice, beans, and cooking oil alone represent, on average, between 21 and 24 percent of total household food expenditures. Beans are second only to rice in average valuation of household food expenditures, equal to 8.3 percent for rural and 6.9 percent for urban areas (Jensen, et al., 1990a).

From an income perspective, beans provide more than 14 percent of gross production value on Haitian farms, well ahead of the 3.6 percent share of production value represented by cash crops such as coffee. For the poorest group of Haitian farmers,

those with small farms in the arid mountains, beans represent almost 20 percent of gross farm production value (Wiens and Sobrado, 1998).

1.2 Objective of Study

The general objective of this inquiry is to use a subsector analysis to describe the current structure and performance of the marketing system for improved beans in Haiti. Of particular concern are relationships between actors in the subsector and the effect information costs have on the underlying structure of their interactions. The specific objectives of the inquiry are to:

- Develop a conceptual framework for analyzing the demand for improved beans.
- Describe major actors in the bean subsector and the nature of their interactions.
- Examine how current government policy affects farmers' access to improved beans.
- Identify organizational factors that constrain farmers' access to improved beans.
- Identify how institutional innovations in the bean subsector affect farmers' access to improved beans.
- Assess farmer demand and willingness to pay for improved beans.
- Identify insights about the Haitian market for improved beans that are transferable other nations that face similar challenges.
- Propose activities required for the development of a sustainable improved bean marketing system.

1.3 Research Questions

Subsector analysis fundamentally involves the study of factors that affect the supply of and demand for a product. These factors originate from an amalgam of organic economic constraints inherent in a particular good, the institutions that affect interaction and decision making among industry participants, and national economic conditions. To meet the objectives of this inquiry, research will concentrate on the following questions.

Relationships in the subsector:

- How do the state and seed companies acquire new varieties for evaluation and eventual distribution to farmers?
- What are the inherent characteristics of improved beans and how do these affect the structure of the market?
- How do actors in the subsector deal with the transactions costs that they encounter?
- How do the different choices made by actors affect performance in the subsector?

Farmer demand for improved seed:

- Why do Haitian farmers purchase beans and where do they purchase them?
- How do farmers acquire their beans and what characteristics influence their decision to favor one variety over another?
- What are the characteristics of farmers who use improved beans?
- Are farmers willing to pay more for improved beans and if so, how much?
- How do seed companies and the state stimulate demand for improved beans?

1.4 Thesis Organization

The thesis contains five chapters. The first chapter outlines the problem statement, defines thesis objectives, and describes the research questions. Chapter Two presents an overview of the problem setting and reviews studies related to the thesis objectives and hypotheses. Chapter Three presents the data collection method and outlines the framework for analyzing the subsector. Chapter Four describes Haiti's improved bean seed subsector, analyzes the data collected, and presents empirical results. Chapter Five summarizes the thesis and describes the policy implications and opportunities for future research.

CHAPTER 2

ECONOMIC AND POLITICAL DEVELOPMENT IN HAITI

2.1 Physical and Demographic Setting

Haiti and the Dominican Republic occupy the western and eastern sides, respectively, of the island of Hispaniola in the northern Caribbean Sea. Located between 18° and 20° north of the equator, Haiti enjoys a mild tropical climate. The number and complexity of Haiti's ecosystems belie the nation's surface area of 28,000 Km^2 (10,360 M^2) --roughly equal to the size of Maryland. Extensive mountain ranges, some with peaks reaching a height of more than 2,600 meters above sea level, create localized climates with annual rainfall ranging from 400 mm to more than 2,500 mm.

2.1.1 Agricultural Land

The topography that creates a diverse climate also challenges efforts to increase agricultural output, for more than one-half of Haiti's land area consists of mountains with slopes that exceed 40 degrees. Nearly 30 percent of Haiti's cultivated area classifies as marginal agricultural land. The deforestation that accompanies expansion of farmland into marginal areas creates severe erosion. In turn, silt and highly variable water flows from this erosion threatens reservoirs for irrigation and power generation. Heavy erosion is a special problem in Haiti because it lies directly in the path of tropical weather patterns. Major hurricanes periodically hit Haiti and devastate both standing crops and agricultural infrastructure. The last major hurricane to hit Haiti, hurricane Georges in September 1998, caused an estimated 400 casualties and over $80 million in direct losses

to crops and agricultural, private, and public infrastructure. With indirect and secondary losses included, damage totals reached over $180 million (USAID, 2000).

2.1.2 Demographics

Haiti's population in the year 2000 is an estimated 7.8 million, which gives it a population density of more than 300 people per square kilometer. Roughly 65 percent of all Haitians live in rural areas. An infant mortality rate of 71 per 1,000 contributes to a life expectancy of 54 years, almost 16 years lower than the average for Latin American nations. The total fertility rate is 4.3 births per woman, which indicates an annual population growth rate of approximately 2.1 percent. Forty-nine percent of the adult population is literate, as compared to the Latin American average of 78 percent. Haiti is the poorest nation in the Western Hemisphere, and ranks among the poorest nations in the world. Its GNP per capita of $460 is only about 12 percent of the Latin American average GNP per capita of $3,840 (WorldBank, 2000).

2.2 Economic Setting

Haiti's poverty is a direct result of poor economic performance. During the past four decades, growth in per capita income has stagnated. Indeed, GNP per capita fell at a rate of 5.2 percent a year over the 1985 to 1995 period. The fact that only 20 percent of public sector resources go to rural areas, where 65 percent of the people live, exacerbates this situation. Not surprisingly, about 80 percent of the rural Haitian population lives in poverty, with rural poverty rates in the north and northwestern departments exceeding 90

percent. The World Bank estimates that Haiti requires an annual growth rate of at least 5 percent to achieve significant progress in poverty reduction (WorldBank, 1998).

The structure of the Haitian economy, in terms of sector contribution to national GDP, is approximately 30 percent agricultural, 20 percent industrial, and 49 percent services. Average growth in agriculture and industry actually fell between 1979 and 1999. Annually, agriculture fell at a rate of –0.5 percent between 1979 and 1989, and –3.2 percent in the 1989 to 1999 period (WorldBank, 2000).

Political turmoil, and donor nations' response to it in particular, has had long-term negative effects on economic growth. The economic sanctions imposed by the international community after the 1991 military overthrow of Jean-Berthrand Aristide devastated the Haitian economy. For example, agricultural production dropped by 17 percent between 1991 and 1994. Before the 1991 economic embargo, 70 percent of the Haitian population was food secure. By 1998, almost four years after the removal of the embargo, the proportion of the population that was food secure declined to 50 percent (WorldBank, 1998a).

The government of Haiti relies heavily upon foreign aid. Between 1971 and 1994 Haiti received more than $3.1 billion in foreign assistance, with $1.4 billion coming from the United States. This sum, on average, represents about 10 percent of Haiti's annual GDP. Aid from the United States over this period averaged $130 million each year, or about $16 per capita per year (Bandow, 1997). Currently, the United States is Haiti's largest single source of foreign aid funds. USAID's fiscal year 2000 request for $96.5

million consists of $70 million in economic support and $26.5 million in direct food aid (USAID, 2000).[5]

Economic activity in Haiti does not generate enough tax revenue to concurrently support essential government functions and investments in agriculture, education, infrastructure, and security. To address this situation, the national budget has two components: operations and investment. The operations budget pays the basic salaries of government employees from national tax collections and donor support. Between 1994 and 1996, donors financed approximately 27 percent of Haiti's annual government operations budget. After political turmoil in 1997, this proportion dropped to approximately 7 percent between 1997 and 1999. The investment budget is funded primarily by grants or loans from organizations such as the World Bank, the Inter American Development Bank, the European Union, the Japanese International Cooperation Agency, the Republic of China (Taiwan), and USAID (USAID, 2000).

Often the funds available from the operations budget are sufficient to pay only the salaries of government employees, with no funds available for those employees to carry out their work plans. Donor response to political conditions in Haiti frequently delays the disbursement of funds promised for the investment budget. For the year 2000, the Haitian government expected external assistance to fund as much as 70 percent of the investment budget (Prophète, 2000). However, donor concern over the conduct of the May 2000 legislative elections led the foreign community to bypass Haitian government channels and primarily disburse aid money through private voluntary organizations.

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[5] For Haiti in 1999, this occurred under P.L. 480, Title II.

Thus, political instability severely constrains the Haitian government's role in creating programs for long-term and sustainable economic development.

2.3 Political and Economic History

The problems of modern Haiti result from the cumulative effects of its history. It is a nation whose past mortgages its future. Despite numerous attempts to establish democratic rule, despotism, terror, corruption, and neglect are hallmarks of the Haitian experience. Haiti has never known a competitive political system, with honest elections or benevolent government. The failure of innumerable reform efforts and billions of dollars in foreign aid to effect change is the source of great frustration for the international community. But Haiti did not start, as one commentator now terms it, as the "sick man" of the hemisphere (Rotberg, 1988).

2.3.1 1697-1804, The French and Freedom[6]

Rapid improvement in agricultural production followed France's 1697 acquisition of Haiti from the Spanish, earning the island the moniker 'Pearl of the Antilles'. Colonial era investments in roads, irrigation schemes, and the consolidation of land into large plantations took full advantage of Haiti's mild climate and rich soils. The urgent need for plantation labor led the French to continue the Spanish policy of slave importation, with more than 500,000 slaves of African origin inhabiting Haiti by the last decade of the 18th century. For almost 100 years, a lucrative trade in cotton, sugar, coffee, and indigo led Haiti to become what Adam Smith declared the "most important of the sugar colonies of

the West Indies". The slave rebellion that ended with independence in 1804 devastated the Haitian agricultural sector. White and mulatto landowners were killed or fled their land. Plantations, irrigation systems, and processing facilities all suffered substantial, though reparable damage during thirteen years of insurrection and neglect.

2.3.2 1805-1820, Latin America's First Land Reforms

Haiti's first post-revolution leader, Jean Jacques Dessalines, attempted to restore plantation agriculture through a system of forced labor, which utilized citizens not engaged in skilled trades. After Dessalines' assassination in 1806, the new nation split into two feuding states. The leader of the southern republic, Alexandre Pétion, undertook land reform by giving subdivided plantations to his army officers and supporters and selling land to emancipated slaves. Pétion made no great effort to restore plantation agriculture in southern Haiti. Rather, he sought to stimulate productivity through price supports for sugar and coffee, *métayer* (sharecropping), and promotion of exports.

In contrast to Pétion, the policies of his opponent in the kingdom to the north, Henri Christophe, more closely followed those set by Dessalines. Through the introduction of a legal code, the *Code Henri*, he sought to instill virtues of discipline and hard work in his subjects. Under Henri's iron rule, plantation agriculture and the commercial economy in the kingdom flourished until a military coup induced the unpopular Henri to commit suicide.

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[6] Unless otherwise noted, this section to 2.3.5 draws from (Moore, 1972)

2.3.3 1821-1915, Reforms and Decades of Turmoil

Jean Pierre Boyer reunified Haiti in 1820. Boyer extended Pétion's policy into the north of Haiti and subdivided plantations into smallholdings. While the lives of the former slaves improved, Boyer's action decimated commercial agricultural production. Boyer also adopted elements of Christophe's coercive legal code in an attempt to force peasants to produce export crops. Neither strategy worked well and at the time of Boyer's overthrow in 1842, peasant production of crops for domestic consumption predominated in most areas.

The seven decades following Boyer's departure were years of intense political instability. Until the arrival of US marines in 1915, only one out of twenty-two heads of state served out his prescribed term in office. Investments in public services were minimal and, as families expanded from one generation to another, smallholdings were divided into increasingly small plots of land.

2.3.4 1916-1986, The First U.S. Invasion and 'Papa Doc'

Agriculture rebounded slightly during nineteen years of US military occupation from 1915 until 1934. The United States undertook vast infrastructure projects and maintained tight fiscal control of the government. Progress continued and peaked during the presidency of Paul Magloire (1950-1957), supported by a strong American business presence, sustained aid from the US and the nascent United Nations, and relatively high world sugar prices. The regimes of François 'Papa Doc' and his son Jean Claude 'Baby Doc' Duvalier marked the end of this era of agricultural progress in Haiti. For thirty years, the Duvalier government largely ignored impoverished rural populations, save for the purposes of exploitation through repressive taxes and theft of development and

humanitarian aid. During this time foreign donors frequently suspended development aid due to concerns over human rights abuses and anger over the outright theft of development funds (Lundahl, 1983).

2.3.5 1987-2001, Instability and the Second U.S. Invasion

Since the overthrow of 'Baby Doc' Duvalier in 1986, Haiti has careened from one severe constitutional crisis to another. In 1988, military junta strongman Lt. General Henri Namphy summarized the mood of the Haitian elite when he rejected the post-Duvalier constitution with the proclamation: "Constitutions are not for Haiti". However, the deepest crisis in recent years involved the 1991 military coup and consequent exile of the democratically elected government of Jean Berthrand Aristide. For the three years of Aristide's exile, donor nations suspended all but humanitarian aid and placed Haiti under an economic embargo. By the time Aristide returned to power in late 1994, the Haitian economy had essentially collapsed, particularly the agricultural sector. Since Aristide's return, political turmoil in Haiti has continued, even as economic and political reforms proceed with the encouragement and financial backing of the international community.

2.4 The Weight of History

For almost 200 years, the primary concern of the Haitian state apparatus has been to extract wealth from agricultural production and extend patronage to political supporters. One lingering consequence of Pétion's land reform was that the dominant class lost its ability to create wealth from land and turned to government service as a source of income. Thus, the political arena became a venue where a number of small

elite groups fought to further their own interests and despoil the economy. This system not only excluded the peasantry from any form of real political influence, but also siphoned away the private and government investment necessary to drive productivity and growth. Throughout the latter half of the nineteenth century, this elite unflinchingly indebted the nation, with international loans destined for the pockets of politicians. Because of this uninhibited race for the spoils and perquisites of office, Haiti became a state where corruption was ubiquitous (Lundahl, 1983). The most notorious of Haiti's modern 'presidents', François Duvalier, wrote of this phenomenon in 1959, and unconsciously telegraphed the attitude his own regime would only perpetuate:

> "Our governments never cared about the national inheritance and never attempted to stop social griefs. They talked a lot about liberty, only to fool the free world instead of using it fairly as a domestic policy. The country is split into two groups; the exploiters –restless and foolhardy minority- monopolize the administrative power and paralyze the progress of the masses; the exploited –the great majority- (are) victims of a wrongful and cruel system." (Rotberg, 1988).[7]

In the later half of the twentieth century, foreign assistance projects sought to provide many of the public service responsibilities abdicated by the Haitian government. Deeply rooted corruption required that international and private assistance bypass government channels in order to reach targeted groups. In the 1950s, direct international involvement in agricultural and human capital investments became an effective means of routing funds away from the grasp of the Duvalier regime. This change greatly

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[7] Quoted in Jean-Pierre O. Gringas, *Duvalier, Caribbean Cyclone: The History of Haiti and Its Present Government*, New York: Exposition Press, 1967, pp. 105-106

strengthened the later emergence of the Non Governmental Organization (NGO) sector and fostered the development of local and national NGOs.

Over time, as the Haitian government abdicated more and more of its public responsibilities to aid donors, the services provided by NGOs evolved into a parallel government for the provision of public services in agriculture, education, and public health sectors. By the end of the 1990s, NGOs delivered about 50 percent of primary and curative services and either NGO or private for-profit institutions ran almost 80 percent of all primary and secondary schools (White and Smucker, 1998). Today, hundreds of local and international NGOs operate in Haiti and perform most tasks commonly associated with national government.[8]

2.5 Haitian Economic Reforms

Aid donors renewed their efforts to implement economic reform programs with the return of civilian government to Haiti in late 1994. A major objective of these reforms has been to improve the standard of living of the population through high levels of sustained growth (Guzmán, et al., 1998). As with all development-related projects in Haiti, foreign aid finances the majority of investments. Currently, donor activities support three general goals: redefining the public sector's role to one that better meets the development needs of the country, promoting efficiency and effectiveness of the public service in the delivery of basic services, and creating of an environment conducive to private sector development (WorldBank, 1998). The most recent reform efforts focus on

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[8] Estimates vary as to the exact number of NGOs that operate in Haiti. The number registered with the Ministry of Planning is 170. The FAO reports that other estimates are in the range of 800-2,000.

fiscal discipline, privatization, and civil service downsizing in the pursuit of the overall policy objectives.

2.5.1 Reforms in the Seed Sector

In 1997, the Haitian government identified two strategies for developing its agricultural sector: organizing farmers at the grassroots level and reinforcing their means of production. Within the latter strategy, the government noted that improved seed deserves special consideration for increasing agricultural production (CIPDSA, 1997). The government of Haiti has developed national seed research and marketing plans for more than 30 years. However, a chronic lack of funds and political upheaval continue to impede the activities of the Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR), the responsible ministry.

A unit within MARNDR, the Center for Agricultural Research and Development (CRDA), is responsible for conducting varietal research and development. However, due to the chronic lack of funds in the investment budget, CRDA researchers do not have the resources and opportunities to actively pursue varietal development. While a few highly motivated CRDA researchers collaborate with public, private, and NGO researchers throughout the Caribbean, Latin America, and the U.S., (including the International Center for Tropical Agriculture (CIAT) and the Bean/Cowpea Collaborative Research Support Program (CRSP), there is generally little varietal development for most crops. Consequently, CRDA programs typically have little impact on development of the seed sector. Still, Haiti's government recognizes that the creation of a vigorous improved seed market is one of many reforms needed to reverse decades of agricultural stagnation and decline.

2.5.2 Seed System Overview

Douglas delineates four stages of national seed sector development: sustenance, early commercial, expanded commercial, and mature. In the first, or sustenance stage, farmers produce and save seed for personal consumption and local sale or exchange. Varietal improvement occurs gradually at a local level through farmer self-selection and introduction of new local land races. During this stage, formal seed breeding activities consist of limited evaluation and distribution of non-native varieties obtained through linkages with international research organizations (Douglas, 1980).

In the second, or early commercial stage, public sector research programs identify varieties from local and external sources that perform well under local conditions. This research leads to opportunities for the development of small, commercial seed markets. At this stage, public programs provide resources for research and development, while a small private sector multiplies and sells seed of a limited numbers of major crops to the more successful farmers. Because of the limited quantities of improved seed available, most farmers remain outside the formal seed system, which constrains improvements in crop production.

At the third stage, expanded commercial seed activities place greater emphasis on the development of a seed market as high-yielding varieties replace traditional ones. Varietal development in the private sector broadens and the private sector emphasizes higher profit hybrids. Competition in the private sector may lack intensity and government contract often subsidizes the production of commercial seed subsidized. However, seed quality may be poor, distribution inefficient, and market supply exceeds farmer demand for seed.

In the fourth stage, active public and private varietal research and development are characterized by a focus on the needs of consumers in mature seed systems. Private firms may either specialize their operations into niche markets or diversify to encompass many related activities. Most farmers purchase at least a portion of their seed from commercial sources and demand not only seed, but also new and high-performing varieties (Douglas, 1980).

Under Douglas' classification, the Haitian seed sector is clearly in the early commercial stage. The essential question for Haitian policy makers is how to promote a seed sector that effectively provides Haitian farmers with the best possible seed. The chapter that follows describes how this sort of transformation occurs and constructs an analytical framework for examining Haiti's seed sector.

CHAPTER 3

THEORETICAL FOUNDATIONS, RESEARCH DESIGN, AND ANALYTICAL FRAMEWORK

3.1 Theoretical Foundations

The current focus of the Haitian government and aid donors on agricultural market reform recognizes the potential benefits that private sector investment may bring to the Haitian economy. These benefits include lower input prices, greater and faster farmer adoption of new technology, and increased yields that arise when new technologies and structural changes allow markets to move improved varieties efficiently onto farms. Physical and genetic improvements to the seed farmers plant are one important source of change in the market. However, these changes alone are usually not sufficient to move the new technology into farmers' fields.

Ruttan and Hayami note that one of the most important areas for public investment in agriculture is the "modernization of the marketing system through the establishment of information and communication linkages necessary for the efficient functioning of factor and product markets" (Ruttan and Hayami, 1990). Market performance then, is a consequence of the way actors in the market organize their information and communication linkages. Public investment, which includes agricultural laws and policies, helps set the boundaries and incentives under which actors organize their market activities.

3.1.1 The Dual Nature of Seed

Seed is both a consumable input and a source of genetic information. As a consumable input, seed combines with land, labor, water, and fertilizer to produce a crop. Seed is also the source of germplasm, the genetic information that determines how the input transformation process occurs and exactly what products result from it. Even if a farmer desires only one attribute of seed purchased off-farm, both manifest themselves in the purchased seed. Robert Tripp emphasizes that, since farmers demand seed off-farm for various reasons, formal seed provision activities must first strive to identify the nature of this demand. Demand for germplasm, Tripp notes, is not the same as demand for a consumable input. Farmers may purchase germplasm to obtain a new variety, renew genetically degraded stock, or to grow a new crop. They may also purchase seed because of high costs or technical requirements associated with on-farm seed conditioning and storage. Finally, because poverty forces many farmers to monetize their harvest, they may simply require seed of any type for planting (Tripp, 1997).

3.1.2 Characteristics of Improved Seed

Every economic good has inalienable, organic characteristics that are functions of physics and biology. These characteristics create boundaries that define the range of economic choices that actors in the market can make (Schmid, 1987). Three attributes of improved varieties affect production and consumption incentives in the market. These are transparency, subtractability, and excludability (Morris, et al., 1998). Transparency refers to the degree to which improved variety attributes are evident to potential users. As a consumable input, beans, for example, have low transparency: visual inspection may not accurately reveal the health, viability, and genetic purity of the seed. As germplasm,

beans are non-transparent: non-destructive determination of their genetic composition is impossible.

Subtractability refers to the degree to which use of a variety by one person precludes its use by another. Since two farmers cannot both plant the same bag of seed, all varieties have high subtractability as consumable inputs. However, as a source of genetic material, beans have low subtractability: one farmer's use does not directly affect the ability of another to plant the same variety.[9]

Excludability refers to the ease with which a seed seller can deny access to unauthorized users. As a consumable input, all varieties have high excludability since a vendor can easily exclude unauthorized users through control of the price. Differences in the way varieties reproduce influence the degree of excludability. Self-pollinated varieties, such as beans, have low excludability since each new generation not only contains the same information as the preceding one, but the rate of genetic decline is slow. Therefore, control of the genetic information contained in self-pollinated varieties such as beans is nearly impossible once a farmer makes his purchase. By contrast, hybrid varieties have high excludability: duplication of hybrids is easily restricted to those who know the pedigree and/or have access to the parent lines (Morris, et al., 1998).

Table 1 : Economic Characteristics of Improved Beans

Attribute	Use	
	Genetic Material	Consumable Input
Transparency	Non-Transparent	Low Transparency
Sutractability	Low Subtractability	High Subtractability
Excludability	Low Excludability	High Excludability

[9] Morris notes that indirect effects may occur when use of a particular variety affects market price.

3.1.3 Transactions and Transactions Costs

Transparency, subtractability, and excludability affect the structure of the market by imposing transaction costs on potential users of improved varieties. Since the precise combination of these three attributes varies, the type and severity of transaction costs depends upon the species and variety. John Commons first identified transactions as the base unit in institutional economic analysis. Commons posits that the transfer of rights to future ownership between actors occurs within a combination of formal and informal rules enforced through collective action. These rules, or institutions, create expectations about the behavior of transacting parties (Commons, 1931).

Ronald Coase expands upon Common's theme with his observation that how assets are used is an important determination of economic performance. For Coase, organization of a firm represents an alternative way to achieve the same result as would have occurred in the market, but possibly at lower cost. Firms organize to avoid future transaction costs that arise from two sources: agency and asset specificity problems. The agency problem is, in general terms, a situation that arises when the action of an agent affects another, the principal. The central question for the firm is whether it costs less to monitor the actions of its own employees or those of someone else. The uncertainty that surrounds a firm's investment in assets that are expensive to convert for use in other economic activities creates asset specificity problems. In the case of asset specificity, the question for the firm is whether internal production costs are less than transactions in the market (Coase, 1937). Coase also argues that governmental administrative regulation may be economically efficient when transactions must occur between many actors. Thus,

the challenge for government is to create an arrangement that will best encourage economic efficiency (Coase, 1960).

3.1.4 The Behavioralist Approach

For Oliver Williamson, the problem is not when to transact, but how. Williamson observes that some costs have their source in unpredictable human behavior. To this point, Williamson makes two observations about the behavior of individuals. The first is that a decision-maker inevitably has a limited ability to process information. This assumption of 'bounded rationality' helps to explain why individuals may transact inefficiently. The second observation is that individuals often act opportunistically, and do so with guile. Thus, the challenge for the organization of economic activity is to economize on bounded rationality and safeguard transactions against the hazards of opportunism (Williamson, 1988).

Williamson and Commons each bring a slightly different perspective to the problem that transaction costs create in economic organization. Williamson recognizes that the unpredictable nature of individual behavior, as expressed through bounded rationality and opportunism, give rise to measurement and contractual problems. For Williamson, transaction costs arise from the quality and quantity of information. For his part, Coase recognizes a problem with uncertainty of information about the future. Thus, the agency problem and asset specificity create transaction costs that place limits on the ways firms can profitably organize.

3.1.5 Institutional Change

Institutions, Douglass North observes, are human-devised constraints that may reduce some of these transaction costs. Thus, the vital role of institutions is to reduce the uncertainty inherent in human interaction and limit and define the set of choices of individuals by establishing conventions, codes of conduct, norms of behavior, laws, and contracts. These rules evolve over time and modify economic behavior through progressive modifications in the range of available choices. The costs directly attributed to determining the value of goods, protection of rights, and policing of agreements between transacting parties necessitate the creation and maintenance of institutions. North also argues that the state is an important institution that reduces transaction costs when it impartially operates a well-specified legal system and enforcing the rights of economic actors (North, 1990).

3.1.6 Role of Institutions in Development

Economic literature often refers to the important role that institutions serve in facilitating economic development. Nabli and Nugent note that institutions can facilitate or retard economic growth, but in either case institutional change lies at the heart of the long-run economic development process. The degree to which well-developed and efficiently functioning markets exist, they argue, depends critically upon the ability of institutions to affect the reliability of information and monitor and modify opportunistic behavior. By setting rules and constraints, governments in developing nations influence the conduct of the economy (Nabli and Nugent, 1989).

Given the link between seed attributes and economic incentives, the fundamental decision for government concerns identifying the policy changes necessary to increase

access to improved seed and reduce its cost. One way for government to encourage change in a positive direction is to adopt, enact, or enforce rules that reduce uncertainty and increase opportunities for economic actors. These rules of society, collectively referred to as institutions, may be economic, legal, or moral in nature. In each case, institutions facilitate coordination among economic actors by helping them form expectations about the behavior of others. "Institutions that govern the use of technology", Ruttan and Hayami write, can induce changes that enable "both individuals and society to take fuller advantage of new technical opportunities under favorable market conditions" (Ruttan and Hayami, 1990).

3.1.7 Social Capital

The term 'social capital' generally describes the resources associated with interpersonal relationships (Robison, et al., 1999). More specifically, the Social Capital Initiative at Michigan State University defines social capital as "a person's or group's sympathy or sense of obligation toward another person or group that may produce a potential benefit, advantage, and preferential treatment to that other person or group of persons beyond that which might be expected in a selfish exchange relationship". In marketing activities, social capital reduces transaction costs when an actor's sense of obligation or sympathy prevents that actor from using guile or the bounded rationality of others to exploit them.

Fafchamps and Minten's study of traders in Madagascar found evidence that social capital "enables traders to deal with each other in a more trustworthy manner by granting and receiving credit, exchanging price information, and economizing on quality inspection." Their research identifies three dimensions of social capital that are

important to reducing transaction costs among actors in the market: 1) relationships with other traders, which help firms to reduce transaction costs; 2) relationships with individuals who can help in time of financial stress, which insures traders against liquidity risk and: 3) family relationships, which reduce efficiency, possibly because families demand use of business resources (Fafchamps and Minten, 1999). Murray and Alvarez's 1973 analysis of the Haitian bean marketing system similarly emphasizes the importance of *pratik*, or personalized regular trading relations, as an important component of bean marketing activity in Haiti. They note that these relationships are important at all stages from producer to the retail vendor (Murray and Alvarez, 1973).

3.2 Research Design

Haiti consists of nine administrative divisions, or *departement*. Research for this study was carried out in two separate geographical areas, the capital of Haiti, Port au Prince, and in the mountains and on the Les Cayes plain near Camp Perrin in the *departement du Sud*. The coastal city of Les Cayes, the administrative center for the *departement*, is located approximately 220 kilometers west of Port au Prince (see Appendix A for map). The *departement du Sud* has a population of approximately 655,000. For simplicity, this study refers to the survey area simply as 'Camp Perrin'.

Two physical features dominate the Camp Perrin area. The *Parc National Macaya* is a 5,500 Ha national park that surrounds the 2,300 meter tall *Pic de Macaya*. From the *Parc National Macaya* flows the *Ravine du Sud*, a large river that enters the plain of Les Cayes near Camp Perrin village. These two natural features support a vital man-made resource in the area, the *d'Avezac* canal, which irrigates more than 4,000 Ha

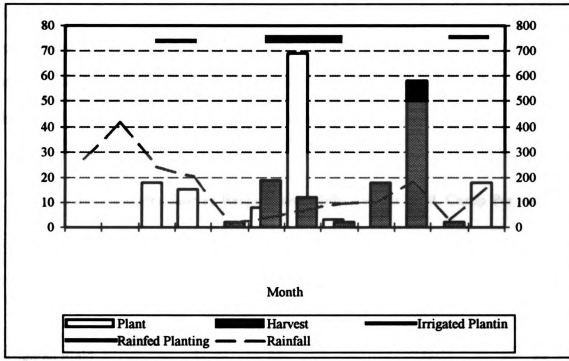
of the plain and makes Camp Perrin an important agricultural region. Irrigation allows farmers to grow several staple crops a year, including maize, sorghum, vegetables, and, most importantly, beans.

3.2.1 Survey Area

Several criteria guided the selection of Camp Perrin for the survey. The first requirement was that the survey should occur in a region where both hillside and irrigated farmers had experience with the same improved bean varieties. The second was that the survey region should be a major bean-producing region. Camp Perrin met these requirements with the added benefit that two separate sources of improved beans exist in the region. For these reasons, Camp Perrin does not represent a typical bean-growing region in Haiti. However, the widespread production and multiplication of improved beans by both rainfed and irrigated farmers in Camp Perrin makes it appropriate as a study area. One caveat attached to the survey results is that the results of the farmer interviews in this one small region may not necessarily represent the national situation. However, information obtained from the government, NGO, and private sector indicates that the data are consistent with national level data.

In Camp Perrin, farmers plant beans in the irrigated plain in early November and again in February. Planting in the mountains occurs in February and, in the higher rainfall areas, again in July. Farmers in the mountains around Beaumont, located about 20 Km to the north of Camp Perrin, produce a third crop of beans each year. These cropping patterns ensure a supply of fresh beans in the local markets throughout the year. Rainfall, which averages about 1,400 mm per year in the region, depends upon elevation. As for all crops, bean production depends more upon rainfall than upon any other factor.

Figure 1 : Rainfall and Cropping Patterns in Camp Perrin, Haiti, Aug. 99-Jul. 00



3.2.2 Target Population

More than 50,000 people live near the town of Camp Perrin. Agriculture employs approximately 75 percent of this population, with the remainder employed in retail and other trades. The rural poverty rate is approximately 80 percent in the Sud (Wiens and Sobrado, 1998)[10]. While this poverty rate is less than in other parts of the country, it is still very high.

Government extension agents and a private seed firm provided information about farmer organizations that had received improved bean seed. Many farmers in Haiti,

[10] The World Bank calculates the poverty line for Haiti by taking the local cost of reaching the FAO minimum nutritional standard of 2,240 calories daily per capita and adding expenditures on non-food commodities, such that the percentage of food expenditure in total expenditure matches the average for poor rural households. In terms of annual per capita income, the estimated poverty line was around $220.

particularly those who use improved seed, belong to local farmer organizations known as *groupement*. Respondents for the survey were selected at random from eight different *groupement* membership lists. In addition, separate interviews were conducted with *groupement* leaders, two production managers from organizations that multiply improved bean seed, and individual bean sellers in the Camp Perrin market.

Table 2 : Bean Farmer Survey Respondents, July-August 2000, Camp Perrin, Haiti

October-November Planting	Traditional Variety	Improved Variety	Total
Irrigated Field	18	6	24
Non-Irrigated Field	7	1	8
Total	25	7	32

January-March Planting			
Irrigated Field	15	14	29
Non-Irrigated Field	38	14	52
Total	53	28	81

3.2.3 Survey Description and Data Collection

The study was carried out between June 25 and August 15 2000. The first phase was conducted in Port au Prince, the capital of Haiti. Interviews with government officials in the MARNDR, CRDA, and the Inter-Sectoral Commission of Production and Distribution of Improved Seeds (CIPDSA) and review of official documents took place between June 25 and July 23. Interviews with the seed production managers for a private seed firm and an NGO also took place during this period.

The second stage took place July 23-August 15, 2000 in Camp Perrin. In this stage, three separate survey instruments were used to interview farmers, *groupement* leaders, and seed firm managers. The farmer survey collected bean production data,

cropping patterns, and farmers' experience with improved bean seed from 83 farmers who planted a total of 197 separate bean fields. Leaders of seven *groupement* provided background information on their groups' membership and their history. Finally, a one-day rapid appraisal of the Camp Perrin market gathered information about market integration, profit margins, and trading habits from five bean vendors and one truck driver. Data collected during the farmers survey were entered into Excel for statistical analysis.

3.3 Analytical Framework

Shaffer's concept of subsector analysis emphasizes that study of an agricultural commodity market should examine both horizontal and vertical relationships in order to identify opportunities to make performance enhancing changes. Changing relationships of technology, preferences, and institutions are explicitly part of this process. While the essential question is of vertical coordination, dynamic and organic factors that influence performance across the subsector are also important factors for consideration (Shaffer, 1973).

Shaffer envisaged two parallel systems at work in a subsector, a physical transformation system, and a coordination system that controls the physical one. Administrative or market processes enable the coordination system to exert its control over the physical one. "Major issues in subsector studies", Shaffer writes, "involve the extent of these two forms of coordination and the practices and institutions which affect them." (Shaffer, 1973). Many consider the subsector methodology, as originally described by Shaffer, as a lengthy, intensive, and time consuming process. However,

economists such as Holtzman have developed a modified subsector approach that uses rapid appraisal techniques to generate an overview of the subsector (Holtzman, 1986). Accordingly, this study adopts the approach of Holtzman while retaining Shaffer's parallel systems concept.

3.3.1 Subsector Analysis

This study uses rapid appraisal methods to describe and assess the bean subsector in Haiti, focusing on the market for improved beans. Activities in the improved bean subsector occur over four vertically connected component stages: varietal development, seed production, processing and storage, and sales and distribution. Varietal development seeks to improve existing plant varieties by selecting desirable genetic traits and producing initial quantities of genetically stable seed. Seed production operations multiply this stable seed into large quantities of commercially exploitable seed. Processing and storage activities prepare and store seed for later use. Sales and distribution operations promote the product, ensure its timely delivery, and provides feedback on the product to preceding stages (Jaffee and Srivastava, 1992, Pray and Ramaswami, 1991).

3.3.2 Determinants of Subsector Performance

Subsector analysis starts from the premise that decisions likely to change performance are those that use minimal adjustments in market structure to the maximum effect. This is known as leverage. In addition to leverage, three other concepts guide the systematic search in the subsector for alternate structural relationships that may affect performance. Examining the vertical supply chains that link actors in the subsector to

each other identifies product movements down each chain, maps relationships between actors, and identifies alternate ways to arrive at similar outcomes. Analyzing variations in competitive practices helps illustrate how one actor develops an advantage over another in the market. Differences in technology adoption and strategic interactions between actors affect the competitive practices that each organization employs. Finally, identifying the level of coordination, or linkages, between actors demonstrates how policies and regulations influence market access and interaction, and how they decide to regulate product flows across component stages (Haggblade and Gamser, 1991).

Leverage, supply chain, competition, and coordination choices made within the subsector influence performance, as measured by the equity, cost-effectiveness, and responsiveness with which economic actors interact. Institutions further affect performance by refining the range of alternate choices within market structures. They accomplish this by moderating the interplay of economic actors. As relationships emerge and evolve to take advantage of alternative opportunities, institutions change, thus creating new occasions for action (North, 1990). Performance then is a consequence of organic characteristics, institutional structures, and choice alternatives made within biological and institutional constraints.

CHAPTER 4

THE BEAN SUBSECTOR

4.1 Introduction

This chapter presents results obtained through interviews with farmers, farmer groups, government, NGO, and private company officials. The first section provides a brief overview of the bean subsector. The second section introduces the major subsector actors in Camp Perrin and describes the present system for developing and marketing improved beans in southern Haiti. The third section describes how market structure responds to attributes of improved beans with respect to transaction costs in the subsector.

AgroTechnique is a privately held Haitian firm that was founded in 1974 as the Haitian agent for Petoseed.[11] In 1991, AgroTechnique began multiplying beans for sale to government and NGO-sponsored food aid programs. Because the bean varieties that AgroTechnique initially multiplied were not genetically improved (i.e. They were high quality local varieties), farmers saw little increase in yield. In 1998, AgroTechnique commenced multiplication of an improved black bean from the Dominican Republic known as Arroyo Loro Negro (ALN), a variety that does have the potential to increase farmer's yields. Because private firms seldom find the multiplication of self-pollinated varieties to be profitable, AgroTechnique's foray into the bean seed market is interesting.

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[11] Until 1995 Petoseed was an American vegetable seed company. It is currently a division of the Mexican-based Seminis corporation.

The underlying question that guides this study is why is AgroTechnique apparently successful, or believes it can succeed, in a business that seed firms in other developing countries usually ignore. Even more important, what are the implications of AgroTechnique's experience for other Caribbean and Central American nations that wish to encourage private sector investment in bean seed production?

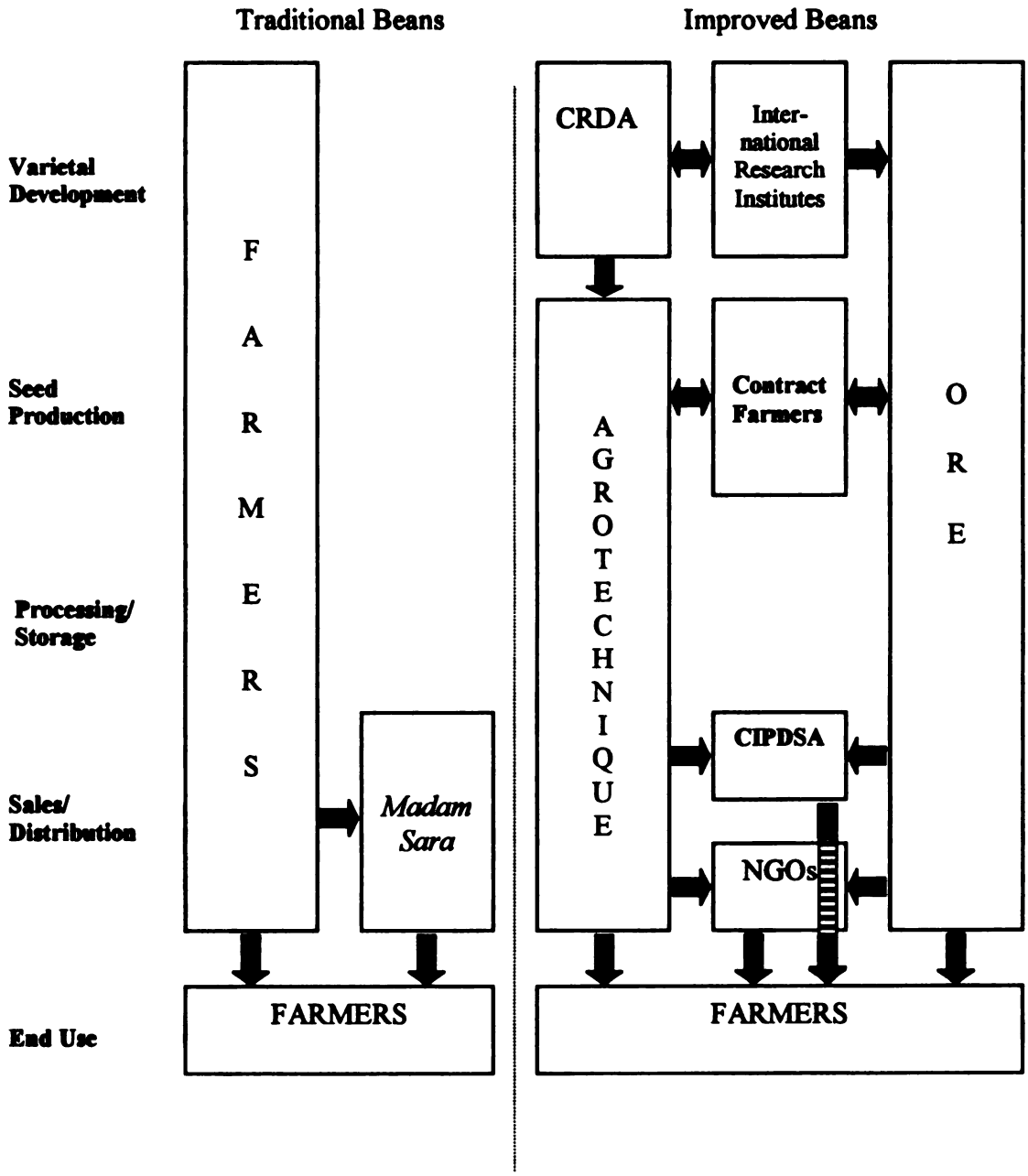
4.2 Subsector Overview

Most improved bean varieties that arrive in Haiti are initially evaluated by MARNDR-CRDA. Figure 2 provides an overview of Haiti's bean seed system. These improved beans originate with the Bean/Cowpea CRSP, CIAT, and researchers in the Dominican Republic. Once the CRDA researcher identifies a variety that performs well under Haitian conditions, samples are sent to interested groups for secondary evaluations, principally AgroTechnique and ORE. These organizations then conduct their own field trials and provide the CRDA with additional feedback. Starting in late 2000, small lots of improved bean varieties were sent to Haiti through an arrangement between ORE and CIAT, under which ORE agreed to test these improved materials.

When AgroTechnique and ORE believe that they have identified a commercially viable bean variety, they start multiplying that variety with farmers. AgroTechnique and ORE conduct all their seed processing operations in-house. After treatment and storage, AgroTechnique and ORE sell improved beans to large distributors such as CARE and CIPDSA. These organizations pay AgroTechnique and ORE a quality premium for the improved beans and then distribute the beans to farmers through their programs. While

ORE sells a small quantity of improved beans directly to farmers, this type of distribution is not part of a concerted marketing effort.

Figure 2 : Haitian Bean Market Subsector Map



4.2.1 Haitian Bean Production

During the past decade, Haiti's bean area has averaged 70,000 Ha, producing 48,000 Mt per year, with yields averaging 693 Kg/Ha (FAO, 2000). Although yields have held more or less steady since the early 1990s, the bean area and total production has trended downward from a high of 97,000 Ha in 1993 to a low of around 51,000 Ha from 1998-2000 (Table 3).[12] Black beans make up approximately 60 percent of the market, mottled and red about 30 percent and yellow, and white an additional 10 percent. Most varieties grown in Haiti are traditional land races.

Table 3 : Haitian National Bean Production, 1990-2000

Year	Crop Area Ha.	Production Mt.
1990	87,000	60,000
1991	94,000	65,000
1992	97,000	67,101
1993	72,000	50,000
1994	72,000	50,000
1995	43,000	30,000
1996	71,300	49,200
1997	72,500	50,000
1998	50,724	35,100
1999	51,000	35,500
2000	51,000	35,500
Average	69,229	47,946

Source : FAO

A complex system of climatic zones and growing seasons allow Haitian farmers to plant several bean crops each year. Farmers produce beans under both irrigated and rainfed conditions. The largest and most important irrigated bean growing areas in Haiti

[12] Given the rudimentary system for collecting agricultural data in Haiti, these data are only approximate estimates.

are the Les Cayes plain and the Artibonite valley. Nationally, Haitian farmers grow beans on approximately 10,000 out of the 75,000 Ha of irrigated cropland. These farmers typically harvest their single irrigated crop, depending on the location, between December and late March, although some irrigation schemes have enough water for two bean crops a year (Prophète, 2000).

Farmers in the mountains grow beans under rain-fed conditions during two cropping seasons. These farmers, who plant approximately 40,000 Ha of beans in each season, harvest in April and September. In the first season, beans are typically planted in association with a cereal crop such as maize or sorghum. Second season plantings in the mountains are usually monocropped. While some high-rainfall mountain areas have enough rain for three crops a year, others have just enough for one crop (Prophète, 2000).

4.2.2 Legal Environment

Haiti has no official legislation that concerns the breeding or introduction of improved varieties. The government requires that imported seeds meet phyto-sanitary standards, but no rules exist to guide varietal introduction or release. Firms that wish to import seed must obtain a license from the Ministry of Commerce, which respondents claim is not difficult. Other than this requirement, there are no tariffs or licensing requirements for importers. Even though no rules exist with respect to the importation or introduction of genetically modified organisms (GMOs), private and public researchers currently do not evaluate GMO varieties.

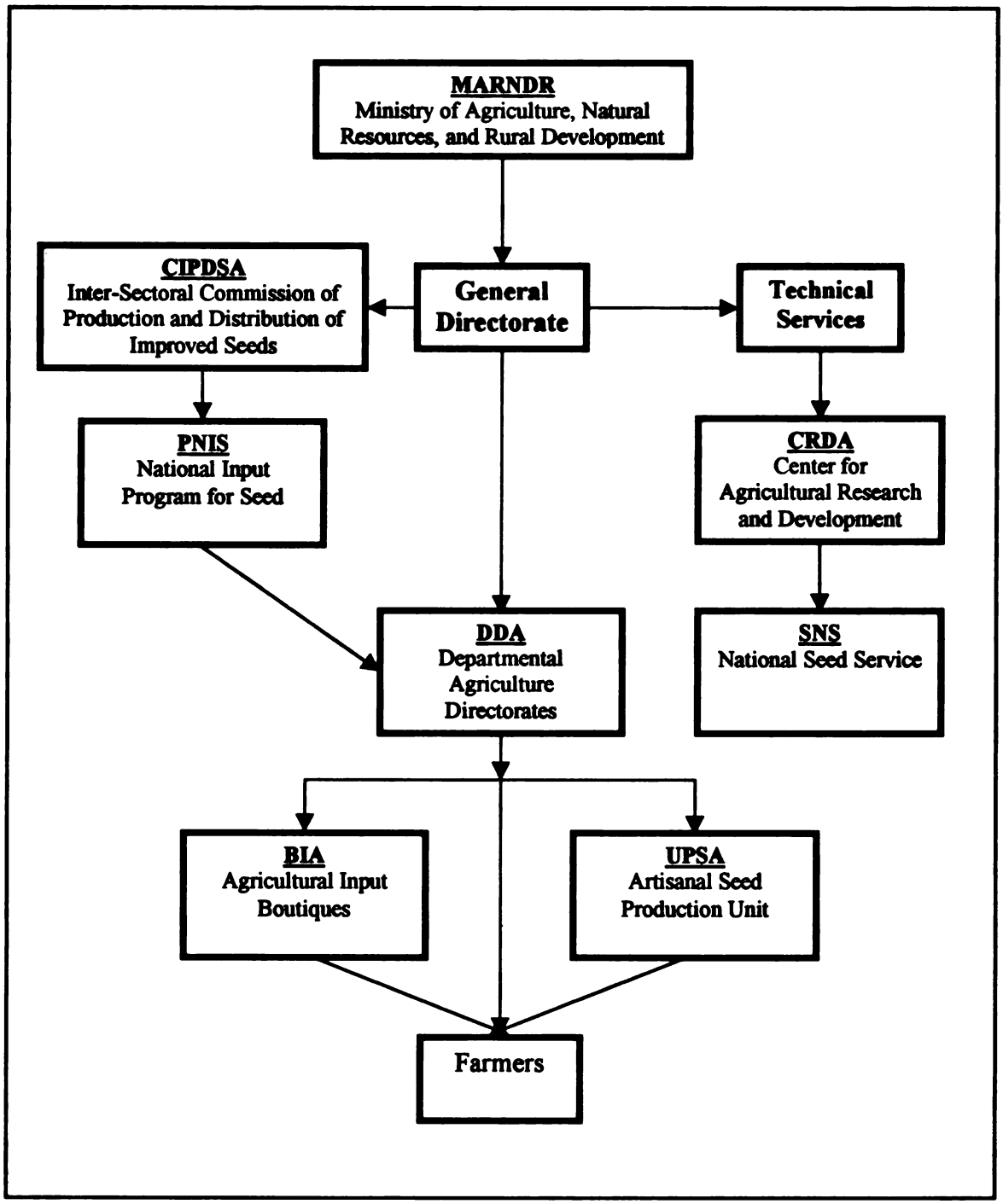
Participants in the sector voluntarily follow official regulations. But, since with no enforcement mechanism, regulations are essentially informal in nature. Currently, the Haitian government does not certify seed, although it plans to do so in the future through

the National Seed Service (SNS). No grades and standards exist for seed used in planting or sold for consumption. Thus, at present, seed-multiplying organizations carry out seed certification under their own standards and regulations (Dominique, 2000).

4.3 Subsector Description

The Haitian government coordinates government activities in the bean market through two organizations (Figure 3). At the ministerial level, the MARNDR sets general research priorities for the CRDA, and allocates agricultural extension resources to the nine *departement* through a network of Directorates of Departmental Agriculture (DDA). However, due to the shortage of funding, publicly funded extension has limited visibility in the rural areas. The other organization, the Inter-Sectoral Commission of Production and Distribution of Improved Seeds (CIPDSA), is primarily responsible for coordinating improved seed policy between aid donors, the CRDA, NGOs, and private Haitian seed companies.

Figure 3 : Organization Chart of Haitian Government Agricultural Activities



4.3.1 MARNDR-CRDA

The Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR) is responsible for coordinating agricultural development in Haiti. Technical services fall into twelve divisions. One of these, the CRDA is responsible for varietal research and development. CRDA research activities suffer from a chronic lack of funds, due to the structure of the MARNDR budget. Since varietal research falls under the foreign donor-funded 'investment' budget, the current shortage of direct development aid prevents sustainable research activities at the ministerial level. The CRDA bean researcher, for example, does not have refrigerated storage or a reliable supply of electricity at the main research center at Damien near Port au Prince. Furthermore, CRDA staff frequently rely on acquaintances in private industry and NGOs to provide transportation to visit research fields and satellite research centers.

4.3.1.1 Bean Breeding and Selection Activities

A practical consequence of this chronic lack of research funding is that no government-supported bean breeding occurs in Haiti. Presently, most of CRDA's bean research focuses on evaluating bean varieties obtained from research centers throughout the Caribbean and Latin America. Over the past 5 years, the Cooperative Regional Bean Program for Mexico, Central America, and the Caribbean (PROFIJOL) and Bean/Cowpea CRSP have provided total annual funding of $6,000-$9,000 for a series of Haitian evaluations of improved beans (Prophète, 2000).

The Bean/Cowpea CRSP and CIAT are the most important sources of improved beans in Haiti. Annually, CRDA screens around 200 new breeding lines from the following market classes: Andean mottled reds, small Meso-American reds, small whites,

and small blacks. The CRDA tested imported Pinto lines for the first time in 1999. New bean lines include stable F8 lines or families and a few early generation families, F1 to F4, which usually combine resistance to Bean Golden Mosaic Virus (BGMV), good yield, and other qualities, such as multiple disease resistance (Prophète, 2000).[13,14]

Despite a lack of CRDA funding for a domestic bean-breeding program, preparations for future breeding activities continue in the face of financial constraints. A current research project focuses on evaluating the CRDA's collection of approximately 500 Haitian bean land races for disease and insect resistance. Once identified, land races with superior traits will be released as new varieties or possibly used as parents in the future, when Haiti is able to obtain resources to establish a breeding program. The Haitian germplasm collection effort is approximately 4 years old and includes material from eight of the nine departements throughout the country (Prophète, 2000).

4.3.1.2 Links with the Dominican Republic

The exact quantity of beans traded annually between Haiti and the Dominican Republic is unknown. Cross-border trade that does occur is at a local level and escapes, perhaps purposefully, the notice of government officials. Farmers from San Juan de la Maguana in the Dominican Republic reportedly sell black beans over the border in Haiti at Elias Piñas.

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[13] The most important diseases that Haitian breeders seek resistance to are Bean Golden Mosaic Virus (BGMV), rust, and bacterial blight. Since bacterial blight is also a seed borne disease, careful field inspections are needed to produce certified seed.

[14] In 2000, around 90 lines came from Bean/Cowpea CRSP -Honduras, and around 80 from Bean/Cowpea CRSP –Puerto Rico. In 2000, CIAT provided an additional 27 F2 families of small red beans.

At the research and development level, the bean program at CRDA has maintained contact for many years with the bean programs in the Dominican Republic, PROFRIJOL, and the USAID-funded Bean/Cowpea CRSP. SEA (the Dominican Department of Agriculture), which is largely funded by the B/C CRSP, developed the black bean Arroyo Loro Negro as well as PC 50, a large red bean. In addition, the B/c CRSP has provided a modest level of financial in recent years to the Haitian bean research program.

4.3.2 CIPDSA

CIPDSA is an inter-sectoral unit composed of nine members from private and public organizations, NGOs, and farmer organizations, who work together to propose seed market policy changes to the MARNDR. CIPDSA's involvement in the seed market dates from 1992, when the Aristide government-in-exile asked the Food and Agriculture Organization (FAO) and the European Union (EU) to help develop Haiti's seed market.

The goal of this intervention was to increase yields through the development of improved varieties and to create a seed distribution system. However, one condition of this intervention was that it not violate the international economic sanctions in place at the time or help to keep the military government in power. Rather than creating a sustainable seed distribution system, FAO's emergency program distributed seed at no cost to farmers. Since yields of the improved varieties available at the time were only marginally better than the traditional ones, FAO's program made no distinction between emergency relief and developing a sustainable seed system. Rather, the scheme emphasized the physical attributes of traditional varieties such as color, size, moisture content, and germination rate. Thus, the FAO program did not distribute improved

varieties, but merely subsidized the costs of shipping, grading, and storing traditional seed (Dominique, 2000).

4.3.2.1 Planned Seed Market Interventions

CIPDSA market interventions have had four thrusts. First, in 1994, CIPDSA negotiated changes in the FAO emergency seed program to allow for the sale of program seed at market prices. At this time, CIPDSA's responsibility changed from coordinating emergency aid to creating a sustainable distribution system for improved varieties. Subsequently, CIPDSA purchased high-quality foundation seed from seed-producing firms for emergency distribution and to farmer organizations, rather than purchasing local varieties in the market. This program included corn, beans, and sorghum.

Second, the National Input Program for Seed (PNIS) administers EU funding for the provision of subsidized seed, fertilizer, and other inputs to farmers. Under the original PNIS program, which was initiated ca.1995, Haitian NGOs and private firms acquired seed, generally in low-price areas, and sorted and treated the seed before selling it to CIPDSA. As the program matured, CIPDSA began to purchase high-quality improved varieties from Haitian seed-producing firms.

Third, in 1994, CIPDSA established a network of Agricultural Input Boutiques (BIA) to facilitate seed distribution in under-served agricultural areas. In 1997, around 50 BIA were functioning, but by December 1999, this number had fallen to 35. The primary reason for this decline is that most BIA cannot generate enough income from the sale of inputs to pay employees' wages.

Fourth, in around 1995, CIPDSA created village-level networks of Artisanal Seed Production Units (UPSAs) to produce and locally distribute improved varieties. In the

future CIPDSA hopes to develop these production units into self-sustaining sources of good quality seed for local farmers. However, only three out of the more than 20 original UPSA are currently operational (RESAL, 2000).

For the future, the goals of CIPDSA in the seed sector are to facilitate the increased production and availability of local food and promote improved availability and distribution of seed and agricultural inputs for farmers. CIPDSA plans interventions in six areas: research support, seed quality control, seed distribution, technology enhancement, promotion of improved varieties, and farm-level technical and economic development. Research support activities will focus on expanding the inventory of local varieties held by the CRDA and promoting the production of basic seed. Seed quality control efforts will involve the creation of a seed certification laboratory, the SNS. Seed distribution efforts will support and reinforce farmer organizations, such as the UPSAs and BIAs. The technology enhancement initiative will emphasize subsidies to increase the distribution of improved farm inputs. Expanding technical knowledge will promote increased demand for improved seed among farmers. Technical and economic development activities will seek to coordinate agricultural development work. Overall, CIPDSA's responsibility lies with the coordination and organization of the sector, while responsibility for technical functions remain with MARNDR (RESAL, 2000).

4.3.2.2 Bean Market Interventions

Beans have been the primary focus of CIPDSA's seed market intervention. From the period 1993 to 1999, CIPDSA distributed more than 2,873 Mt of beans in Haiti, or 46 percent of all seed that it supplied (Gachette, 2000, Guiteau, 1999). For the October to December 1999 period, beans represented more than 82 percent of the 783 Mt of seed

that CIPDSA distributed to farmers. Improved beans comprised 115 Mt, or 18 percent of the beans distributed in this period, the majority of which was black beans (Guiteau, 1999).

Currently, CIPDSA sells farmers and farmer organizations improved beans at about 50 percent of its cost (Guiteau, 1999). This price is set at a level that makes improved bean seed competitive with the price of landraces found in local markets. While contributions from the European Union finance this subsidy, the long-term sustainability of this program is of concern to CIPDSA. CIPDSA estimates that Haitian farmers require approximately 9,000 Mt of beans for planting each year. Thus, the quantity of beans that CIPDSA sells in an average year accounts for only about 4.5 percent of annual Haitian bean requirements.

4.3.3 AgroTechnique

Currently, more than 40 AgroTechnique stores throughout Haiti sell farm implements, fertilizer, seeds, and pesticides. Most of these stores are located in the main vegetable and field crop regions of the country: Kenscoff, St. Rafael, Fôret de Pins, Port au Prince, the Artibonite valley, and the plain of Les Cayes. AgroTechnique first produced beans under contract with farmers in 1990, which it sold to the FAO/CIPDSA programs at a small premium. Before 1998, AgroTechnique multiplied only local varieties or improved bean landraces. However, in 1998 the company began field trials to test an improved bean variety from the Dominican Republic, Arroyo Loro Negro (ALN).

4.3.3.1 Bean Multiplication

AgroTechnique chooses its seed multipliers based on the ease of access to their fields and the quality of their land. Before the planting season, AgroTechnique holds a training session for its multipliers during which it explains the multiplication process, the quality standards that they must meet, and how to apply fertilizer and pesticides. Farmers are provided with a technical information sheet in Creole. Whenever possible, AgroTechnique uses farmers who multiplied seed for it in previous campaigns. Instead of using formal contracts with its multipliers, AgroTechnique sets its purchase price higher than local market prices to convince farmers to sell their crop back to it.

AgroTechnique's main multiplication zones are the high-rainfall Beaumont area and the irrigated plains surrounding Les Anglais and Les Cayes. In 1999, AgroTechnique used more than 280 multipliers, most of who farmed in Beaumont and Les Anglais (Table 4). These growers produced around 100 Mt of ALN on fields averaging approximately 0.25 Ha. For the 2000 season, AgroTechnique used 328 multipliers (Eveillard, 2000). Although final production statistics are not available, of those who had harvested their fields, the average field size was 0.47 Ha, and farmers achieved an average conversion ratio of 1:16.6.[15] This result is similar to conversion ratios found by the survey among AgroTechnique multipliers (1:13.2).

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[15] Because yield data from mono-cropped and inter-cropped fields are not comparable, a conversion ratio gives an actual yield. The ratio is Kg harvested divided by Kg planted. Higher conversion ratios indicate a higher yield. So, if a farmer planted a one Ha.field with 60 Kg of beans, a conversion ratio of 20:1 would indicate a yield of 1,200 Kg./Ha.

Table 4 : AgroTechnique Experience with Improved Beans, Haiti, 1999-2000

Multiplication Statistics	December 1999 – July 2000
Variety	Arroyo Loro Negro
Number of Multipliers	300
Total Ha. Planted	143
Average Parcel Size (Ha.)	0.47
Average Yield (Kg.)	1,327
Total Seed Given (Kg.)	11,440
Total Seed Received (Kg.)	189,820
Ratio – Plant : Harvest	1:16.6

Farmers have several incentives for multiplying for AgroTechnique. First, multipliers receive high quality seed on credit, with free transportation of the seed to a central location in their community. AgroTechnique treats all its beans with Gaucho, a systemic insecticide, to reduce the white fly infestations that spread of Bean Golden Mosaic Virus (BGMV). After harvest, multipliers receive a quality premium of between $0.14 and $0.28 per Kg, which is approximately 20 percent above the market price, and free transport of the crop. AgroTechnique maintains strict quality standards for its multipliers –requiring that seed is 98 percent free of debris and weed seeds, achieves a germination rate of between 95 and 98 percent, and has moisture content between 12 and 13 percent.

During the growing season, multipliers receive technical advice from AgroTechnique technicians, who visit each field approximately every 12 days to check flowering, for disease and insect damage, and proper weeding. Multipliers who fail to maintain their fields according to AgroTechnique standards must still repay their seed loans and risk having their crop rejected.

AgroTechnique based its decision to commence full-scale commercial production on its assessment of the superior yield and profit potential of ALN, compared to other

bean varieties available in Haiti. However, in 1999, AgroTechnique did not sell Arroyo Loro Negro through any of its stores. According to AgroTechnique staff, this was because production of ALN has not reached the point where widespread distribution was possible. Yet, a more compelling reason is that the price that CIPDSA pays for beans is approximately double the market price for local beans. For example, in July 2000, CIPDSA paid AgroTechnique $2,200 per Mt for 25 Mt of ALN, compared to a market price of about $1,000 per Mt for bean seed sold in local grain markets. CIPDSA purchased an additional 10 Mt of ALN around February 2000.

According to AgroTechnique staff, seed production expenses per Mt in the July sale included $237 for treatment, management, and processing and ALN purchases from farmers of $1,489. While the extent of other costs such as salary and equipment depreciation are uncertain, AgroTechnique's apparent 'profit' from its sales to CIPDSA is $474 per Mt.

4.3.3.2 Future Market Activities

Given the fragile nature of Haiti's foreign aid flows, AgroTechnique clearly cannot depend on the long-run availability of CIPDSA's subsidy. One factor that works to AgroTechnique's advantage is that it has a long-established network of input stores, which sell a broad range of agricultural inputs and farm implements. Since farmers who grow improved beans need to use chemical inputs to reduce risk of damage from disease or insects and take advantage of the variety's superior qualities, AgroTechnique stands to gain from farmer use of improved beans from any source. AgroTechnique staff asserts that the company will not use improved beans as a 'loss-leader' to promote the sale of complimentary inputs, but as a stand-alone product.

AgroTechnique constantly seeks new opportunities in the bean market, evaluating promising improved varieties recommended to it by the CRDA bean researcher. When it identifies a good variety, AgroTechnique selects several contract growers to carry out field trials over several seasons. The main attributes sought are resistance to BGMV and a yield potential of 1.8-2 Mt/Ha. Although AgroTechnique has not yet sold ALN through its stores, it has planted demonstration plots near several stores to promote the seed and attract potential multipliers. A typical demonstration consists of five or six plots of the variety in one area. Field days are held at flowering and harvest. AgroTechnique plans for 100 people to attend each field day, and gives interested attendees a 300-gram seed sample.

4.3.4 ORE

The Organization for the Rehabilitation of the Environment (ORE) is a local NGO based in Camp Perrin. ORE started its operations in 1985 and received formal NGO status from the Haitian government in 1989. Its objectives are protecting the environment, improving nutrition, increasing farmer income, and creating a permanent tree-crop industry. ORE's general goal is to provide farmers with economic incentives to protect the watershed that supplies the Dazak Canal. ORE's early activities focused on inducing farmers to plant high-yielding varieties of fruit trees such as mango, orange, and avocado on erosion-prone slopes.

In 1987 a maize breeder, who had previously worked at the state-operated Levy Research Station in Camp Perrin with maize and beans, joined ORE. At this time, ORE decided to broaden its focus to include field crops because fruit trees did not produce sufficient incentive to farmers to take marginal land out of production. High-yielding

maize and well-selected beans were seen as a way to provide this additional incentive to farmers. Today, maize production remains ORE's principal activity, with annual production in the range of 150-200 Mt.

4.3.4.1 Bean Breeding Activities

ORE produces two varieties of improved beans. The first, Tamazulapa, is a selection from a CIAT line. The second, L'Ore 87, was initially selected from a local heat-tolerant landrace at the Levy Research Station. Formal bean production started in 1993, although limited quantities were previously available. In 1999, ORE multipliers produced approximately 60 Mt of each variety. In the future, ORE hopes to develop a more professional bean research program. One problem with ORE's existing varieties is their lack of BGMV resistance. Evaluation of promising CIAT BGMV-resistant varieties started in 2000. ORE hopes to identify several varieties with a yield potential of 1.5-2 Mt/Ha, good resistance to BGMV, and adaptability to a range of growing conditions.

4.3.4.2 Bean Multiplication

Selection of multipliers is a continual process for ORE. Typically, the technical director searches for prospective multipliers among local farmers with access to good irrigation and a field of more than one Ha. Then, ORE holds seminars to explain the multiplication process. Once a farmer has signed a contract, ORE inspects the field for contamination from previous bean crops, and then provides the basic seed and a 50 percent credit towards fertilizer costs. For the 1999 season, ORE used more than 174 multipliers, most of who farmed in the irrigated plain near Camp Perrin (Table 5). In 1999, ORE produced around 50 Mt of Tamazulapa (average field size of 1.47 Ha) and

62.5 Mt of L'Ore 87 (average field size of 1.57 Ha). Conversion ratios for Tamazulapa and L'Ore 87 averaged 1:8.2 and 1:10.1 respectively. Since ORE only records the seed that it purchases, rather than the amount that farmers actually produce, these conversion ratios may under represent the actual harvest --given that some farmers may retain some of the seed they produce.

Table 5 : ORE Experience with Improved Beans, Camp Perrin, Haiti, 1999-2000

Multiplication Statistics	1999	1999
Variety	Lore 87	Tamazulapa
Number of Multipliers	97	77
Total Area (Ha)	152	113
Average Parcel Size (Ha.)	1.57	1.47
Average Yield (Kg.)	405	437
Seed Given	9,094	6,149
Seed Received	62,599	50,369
Ratio Plant:Harvest	1:6.9	1:8.2

As with AgroTechnique, farmers have several financial incentives for contracting with ORE. First, multipliers receive bean seed on credit at the current market price, get a 50 percent credit on any fertilizer used, and can buy pesticides from ORE at full price. While ORE does not charge for transportation from the field, only large groups receive free transportation of seed for planting. Multipliers receive the local market price, plus a quality premium of $0.05 - $0.10 per Kg for their beans at the time of purchase, which represents a premium of about 8 percent above the market price. Since the price of beans is usually lower at the time of harvest than at planting, ORE earns a nominal profit on each transaction. However, since the seed is supplied on credit and losses from drying, sorting, and storage amount to almost 20 percent by weight, ORE gains little, if anything, from the price differential. ORE has strict quality standards --requiring that seed is 98

percent free of debris and weed seeds and has a moisture content of around 17 percent.[16] Farmers who do not meet these standards risk losing their price premium or having the entire crop rejected.

During the growing season, ORE technicians check germination rates, look for disease, and observe the weeding schedule. ORE will not purchase the farmer's crop if serious disease or husbandry problems have damaged the seed, but still requires him to repay the original credit. ORE technicians also monitor the harvesting and threshing. Until transportation arrives, the farmer must store the crop properly. After the first campaign, ORE managers decide whether or not to continue a relationship with the farmer in future campaigns.

On occasion, ORE sells beans directly from its storage facility to local farmers at the local market price. More commonly, ORE sells directly to CIPDSA or an NGO such as CARE at a price of $2,000 per Mt, which reflects the full costs of production and storage. After ORE negotiates a sale contract, it treats the seed with insecticide and puts it in 100-pound sacks for shipment. ORE managers feel that the demand for improved beans is growing, but production beyond 140 Mt per year places a serious strain on their storage and processing facilities. Since ORE is an NGO, it does not technically make a profit from its multiplication operations. The odds that it actually makes a profit are small, given the amount of varietal research that it conducts. ORE managers estimate that USAID and other aid agencies have covered about 50 percent of the cost of its activities between 1993 and the present, and are likely to continue this support into the near future.

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[16] Additional processing at the ORE facility reduces the moisture content to 13 percent.

4.3.5 Farmers

The survey of 83 bean farmers in Camp Perrin identifies those who planted local beans and those who planted one of four varieties of improved beans, Arroyo Loro Negro, Tamazulapa, L'Ore 87, and Mersan, between October 1999 and July 2000.[17] This section presents the survey findings along a timeline of the farmers' primary seed production activities: purchasing, planting, harvesting, and disposal of the bean crop. A fifth sub-section covers questions related to farmers' willingness to pay a premium for improved beans.

4.3.5.1 Bean Cropping Systems

In an average year, more than 2,000 mm of rain falls in Camp Perrin. Traditionally, hillside farmers begin to plant beans and sorghum together in early February and harvest the beans in April. These farmers typically plant a second crop of mono cropped beans in July, depending on the start of the second rainy season. Harvest of the second crop takes place in September or October. Since the rains in February are greater in quantity and considered more reliable, farmers in areas where it is only possible to grow one crop a year plant their beans in February.

Most bean farmers in the irrigated plain in Camp Perrin plant two bean crops, once in late October and again in February. Bean fields in the plain are usually mono cropped in both seasons, with harvests in late December and April. Some farmers on the lower reaches of the irrigation network may receive only enough irrigation water to plant beans in February, when rainfall can supplement irrigation water.

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[17] Because farmers in different locations plant at different times of year, this section presents results both by planting time and by order of season (i.e.: 1st season or 2nd season) where appropriate.

For farmers in the plains as well as those in the mountains, the general pattern of bean planting and harvest times means that they need only store bean seed for short periods of time. When faced with a long storage period, farmers know that they can always purchase fresh, local beans in the market. The proximity of several harvest and planting seasons creates a strong interdependence between farmers in the mountains and plains.

4.3.5.2 Bean Purchases

Farmers in Camp Perrin visit a local market an average of 45 times each year, or about once a week. The time spent traveling to market by foot averaged 80 minutes, although those living near the main road can reach the market in less time by bus. Local markets are the primary source of bean seed that farmers plant, although when farmers plant in the agricultural calendar year is an important factor. In the first planting season, 55 percent of farmers obtained their seed from the local market (Table 7). If CIPDSA had not distributed seed through *groupement* in February, almost 80 percent of farmers would invariably have purchased seed in the market. At 15 percent, ORE also represented an important source of seed.

Comparing the farmers who planted improved beans with those who planted local beans reveals that farmers with more education were more likely to have purchased improved beans for the first growing season (Table 6). Similarly, adopters were less likely to visit the local market.[18]

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[18] The comparison of means/proportions test approximates the standardized difference between two means/proportions to a t-distribution. The degrees of freedom derive from the sample variances and the number of observations for each group.

Table 6 : Education and Frequency of Market Visits by Variety Planted, Camp Perrin, Haiti, 2000

Variable	All		Local		Improved		Proportions	
	N	Mean	N	Mean	N	Mean	SE	p-value
Years of Education	82	4.73	57	3.62	23	7.61	1.1578	0.0015
Market Frequency	83	44.96	58	48.33	23	33.61	5.8801	0.0150

Thirty-eight percent of the farmers who planted a second bean crop obtained most of their seed from the preceding harvest, while only 30 percent obtained their seed in the market (Table 7). ORE and AgroTechnique were also important sources of seed for the second planting, representing between them, the sole source of seed for 24 percent of farmers surveyed.

Table 7 : Farmer Bean Seed Source by Planting Season, Camp Perrin, Haiti, 2000

Seed Source	1st Planting				2nd Planting			
	Farmers		Seed		Farmers		Seed	
	Number	Percent	Kgs	Percent	Number	Percent	Kgs	Percent
Market	45	55.6	732	54.4	15	30.0	188	19.2
AgroTech.	0	0.0	0	0.0	5	10.0	183	18.6
ORE	12	14.8	337	25.0	7	14.0	178	18.2
Friend	1	1.2	3	0.2	3	6.0	62	6.3
Groupement	19	23.5	209	15.5	0	0.0	0	0.0
Self-Stored	3	3.7	61	4.5	19	38.0	350	35.7
CARE	1	1.2	5	0.4	1	2.0	19	2.0
Total	81	100.0	1346	100.0	50	100.0	979	100.0

The survey identified four varieties of improved beans grown by farmers in Camp Perrin. ORE produces two of these, L'Ore 87 and Tamazulapa. AgroTechnique produces Arroyo Loro Negro. The fourth, Mersan, is a selected land race formerly multiplied by ORE. Since local farmers identify Mersan as an improved bean, this analysis includes Mersan in the improved category.

Among the farmers who planted beans, local black beans were the most popular type planted in both the first and second planting seasons, averaging 71.3 and 55.1 percent, respectively (Table 8). While, Tamazulapa and Arroyo Loro Negro were the most popular improved varieties planted in the first season (15.0 and 22.4 percent of respondents respectively) and second season (6.3 and 8.2 percent, respectively), farmers planted a greater quantity of local beans in both seasons.

Table 8 : Farmer Bean Varieties by Planting Season, Camp Perrin, Haiti, 2000

Variety	1st Planting				2nd Planting			
	Farmers		Seed		Farmers		Seed	
	Number	Percent	Kgs.	Av/Kg*	Number	Percent	Kgs.	Av/Kg*
Local Black	57	71.3	837	14.7	27	55.1	445	16.5
Improved	23	28.8	509	22.1	22	44.9	534	24.3
Unknown	*2*	*2.5*	*14*	*7.1*	*4*	*8.2*	*66*	*16.8*
L'Ore 87	*2*	*2.5*	*61*	*30.3*	*2*	*4.1*	*26*	*12.9*
Tamazulapa	*12*	*15.0*	*221*	*18.4*	*11*	*22.4*	*201*	*18.2*
Arroyo Loro	*5*	*6.3*	*107*	*21.4*	*4*	*8.2*	*177*	*44.3*
Mersan	*2*	*2.5*	*106*	*52.9*	*1*	*2.0*	*65*	*64.5*
Total	80	100.0	1,346	16.8	49	100.0	979	20.0

*Av/Kg is the total number of Kg for each variety divided by the number of farmers who planted it.

When asked why they purchased seed for the first planting, 81 percent of farmers (N=42) who planted a local bean indicated that they did not have seed for planting or did not store any (Table 9). These data reinforce the finding that Camp Perrin farmers do not generally store bean seed, except when growing seasons are closely spaced. About 9 percent of these farmers indicated that they purchased bean seed to get a better yield or germination than their own seed offered. Only 50 percent farmers (N=11) who planted improved beans indicated that they purchased bean seed because they needed seed for planting or had not stored any. Of these same farmers, 23 percent indicated that they purchased improved beans to get a better yield or germination.

Table 9 : Reasons Farmers Purchased Bean Seed, Camp Perrin, Haiti, 2000

Reason for Buying Seed	Local Beans		Improved Beans		Total
	Number	%	Number	%	%
Seed for Planting / Didn't Store Any	42	80.8	11	50.0	71.6
Better Yield / Seed Germination	5	9.6	5	22.7	13.5
What was Available in Market	1	1.9	1	4.6	2.7
What *Groupement* Offered	1	1.9	1	4.6	2.7
Credit Offered	0	0.0	1	4.6	1.4
Money for School Fees	1	1.9	2	9.1	4.1
Want Income from Beans	1	1.9	1	4.6	2.7
Higher Price at Harvest	1	1.9	0	0.0	1.4
Total	52	100.0	22	100.0	100.0

When asked why they purchased a particular bean variety, more than 28 percent of farmers (N=15) who purchased a local bean responded that they knew or liked the variety or seed (Table 10). More than 30 percent (N=16) answered that the beans purchased were what they found for sale in the market. An additional 26 percent (N=14) liked the qualities of the seed or variety. Among farmers who purchased improved beans, 53 percent (N=10) responded that they liked the qualities of the seed or variety, 26 percent (N=5) purchased them because they knew or liked the variety, and another 16 percent purchased them because their *groupement* offered this variety.

Table 10 : Reasons Farmers Purchased an Improved vs. Local Bean Variety[19]

Why Purchase this Bean Variety	Local		Improved		Total
	Number	%	Number	%	%
Variety Known / Liked / Trusted	15	28.3	5	26.4	27.8
Sales Point is Near to Home	1	1.9	0	0.0	1.4
What I Found for Sale	16	30.2	1	5.3	23.6
On Credit / Good Price / Groupement	6	11.4	3	15.8	12.5
Like Qualities of Seed / Variety	14	26.5	10	52.7	33.4
Hadn't Stored Any to Plant	1	1.9	0	0.0	1.4
Total	53	100.0	19	100.0	100.0

Many different factors influence farmers' decision to favor one seed seller/vendor or variety over another when they purchase beans (Table 11). Physical attributes such as appearance, color, size, and cleanliness may indicate the general health of the seed and its genetic potential. The price of the seed may also be important, particularly to poor farmers. Finally, farmers may credit individuals or those from specific regions with having good quality seed. When asked about these factors, 32 of the respondents who purchased local varieties indicated that the appearance of the bean seed influenced their decision. Twenty-five indicated that the seed size was important, while 20 said that seed color was important.

Among farmers who purchased improved beans, appearance, size, and color were again the most commonly mentioned factors. More than 85 percent of respondents who purchased local beans said that they were satisfied with the seed they purchased, while 100 percent of those who purchased improved said that they were satisfied. The average price paid per kilogram of beans was $1.71.

[19] Several of these categories are aggregates of farmers' responses to an open-ended question.

Table 11 : Factors Considered in Last Bean Purchase, Camp Perrin, Haiti, 2000

Factors in Transaction	Local Beans % (N=42)	Improved % (N=7)	Total % (N=49*)
Price of Seed	7.1	0.0	6.1
Appearance	76.2	71.4	75.5
Cleanliness	14.3	14.3	14.3
Previous Transactions with Seller	4.8	14.3	6.1
Reputation of Seller	2.4	0.0	2.0
Color	47.6	42.8	46.9
Size	59.5	71.4	61.2
Satisfied with Seeds Purchased	85.7	100.0	87.8

*A number of respondents did not purchase beans, so total N is less than in other comparisons

4.3.5.3 Bean Planting

The average Camp Perrin farmer plants 1.39 hectares of beans in the first planting season and averages 16.8 kilograms of seed per hectare (Table 12). Planting in the second season averages 0.64 Ha., with 20.0 Kg. of seed. The amount of land planted in the second season is, on average, about half of that planted in the first season for both local and improved beans. The slightly higher average seeding rates reflect the traditional switch to bean monocrops in the second planting season.

Table 12 : Area and Seeding Rate by Planting Season, Camp Perrin, Haiti, 2000

Bean Type	1st Planting		2nd Planting	
	# Hectares	Kg/Ha	# Hectares	Kg/Ha
All Varieties	1.39	16.8	0.65	20.0
Local	*1.32*	*14.7*	*0.59*	*16.5*
Improved	*1.55*	*22.1*	*0.72*	*24.3*

The farmer survey identifies two basic technologies that farmers use to grow their beans (Table 13). Irrigation allows farmers who use it to have a much more predictable yield in any season and to plant a second crop in most years. Fertilizer and chemical pesticides represent the second technology that farmers have available. Of all farmers

surveyed, 37 percent planted in the first season in irrigated fields. Almost 52 percent of these farmers used chemical fertilizer and 41 percent used chemical pesticides. Farmers who planted a second bean crop generally increased their use across all technology categories. A surprising finding is that farmers who plant local bean varieties use approximately the same technological packages as farmers who plant improved bean varieties.

Table 13 : Basic Technologies Used by Farmers, Camp Perrin, Haiti, 2000

	1st Planting			2nd Planting		
	% Using (N=81)			% Using (N=50)		
	Irrigation	Fertilizer	Pesticide	Irrigation	Fertilizer	Pesticide
All Varieties	37	52	41	48	62	48
Local	33	52	40	52	67	52
Improved	48	52	44	44	57	44

Farmers who planted local beans in the first growing season had, on average, total costs of $54.11, while those planting improved beans had total costs of $139.27 (Table 14). Seed costs represent a significant difference between farmers who planted improved beans and those who planted local beans, totaling $40.72 and 23.94 respectively (Table 15), even though the latter group spends a greater proportion of their total costs on seed. The greater area cultivated by farmers who plant improved beans explains this difference. The comparison of means test also indicates a significant difference between the two groups with respect to credit costs, which is not surprising given that most credit schemes necessarily include improved bean seed as part of a package of technologies. The rental cost of land and chemical input costs do not show significant differences between the two groups.

Table 14 : Cash Input Costs % Share of Total Costs in First Growing Season, Camp Perrin, Haiti, 2000

Cost Description	Farmers Planting...		
	Local Beans % (N=58)	Improved Beans % (N=23)	Total % (N=81)
Cost of Rented Land	21	25	23
Cost of Seed	44	29	37
Cost of Chemical Inputs	33	21	27
Repayment of Credit	1	25	13
Total	100	100	100

Table 15 : Comparison of Proportions Test on 1st Season Production Total Costs, Camp Perrin, Haiti, 2000

Cost Description	Total (N=81) Mean $	Local (N=58) Mean $	Improved (N=23) Mean $	Proportions	
				SE	p-value
Cost of Rented Land	17.9	11.4	34.5	14.1962	0.1167
Cost of Seed	28.8	23.9	40.7	7.8121	0.0389
Cost of Chem. Inputs	21.3	17.9	29.8	9.2462	0.2103
Repayment of Credit	10.3	0.8	34.3	11.0199	0.0059

4.3.5.4 Bean Harvest

Calculating the yield for each hectare of land planted in beans is complicated by the diverse topography in the survey area. Fields in Camp Perrin may be flat or on stony slopes of 40 degrees or greater. Similarly, farmers may monocrop or grow beans in association with a grain such as sorghum or maize. A measure that accurately captures the effectiveness of a farmer's effort is a conversion ratio, or the number of kilograms planted divided by the number of kilograms harvested. Haitian farmers use this method for measuring the success of their crop. Camp Perrin farmers commonly cite a conversion ratio of between 1:15 and 1:20 as ideal for black beans.

The small sample size for several of the bean varieties makes comparison of several varieties difficult. Local black beans were the most common type planted in both seasons, followed by Tamazulapa and Arroyo Loro Negro. Table 16 shows the relative performance of the five varieties of black beans found in Camp Perrin. These results partially reflect the effect of AgroTechnique and ORE's contract growers. Farmers who grow L'Ore 87 and Mersan are more likely to have obtained their seed in the market and may not use chemical inputs to grow them.

Table 16 : Average Farmer Harvest by Variety, Camp Perrin, Haiti, 2000

Variety	First Harvest				Second Harvest			
	N	Harvest Av.# Kg.	Plant/Harv Ratio	Harvest Value ($)	N	Harvest Av.# Kg.	Plant/Harv Ratio	Harvest Value ($)
Local Black	58	61	4.1	127.5	18	84	5.1	183.3
Improved	22	129	5.6	324.0	13	283	8.5	762.5
Unknown	*2*	*9*	*1.0*	*16.9*	*3*	*181*	*7.5*	*483.5*
L'Ore 87	*2*	*97*	*2.7*	*243.5*	*1*	*23*	*1.1*	*59.2*
Tamazulapa	*11*	*99*	*4.5*	*231.5*	*4*	*155*	*5.9*	*340.3*
Arroyo LN	*5*	*213*	*12.3*	*597.9*	*4*	*591*	*15.3*	*1,683.1*
Mersan	*2*	*290*	*6.5*	*719.2*	*1*	*129*	*2.0*	*309.6*
Total	80	80	4.5	181.6	31	167	6.5	426.2

Farmers who planted improved beans in the first season had a bean harvest worth an average of $324.0, versus $127.5 for those who planted local beans (Table 17). Not surprisingly, the value of farmers' bean crop after subtracting expenses --indicated as 'Profit'-- averaged $170.7 and $73.8 for improved and local beans, respectively. This profit does not take into account the cost of the farmers' labor costs. An interesting result from the comparison of means test is that there is no significant difference in profit for farmers who plant local beans and those who plant improved beans.

Table 17 : Result of Comparison of Proportions Tests for 1st Season Bean Harvest, Camp Perrin, Haiti, 2000

Variable	All Varieties		Local		Improved		Proportions	
	N	Mean	N	Mean	N	Mean	SE	p-value
Total Production Costs	81	77.9	58	53.7	23	139.3	35.84	0.0245
Value of Harvest	80	181.6	58	127.5	22	324.0	87.17	0.0332
Profit	81	101.3	58	73.8	23	170.7	65.70	0.1525

* Results for the 2nd Season harvest are not available

4.3.5.5 Bean Crop Disposition

The disposition of the bean crop is an important part of farmer behavior. Again, the number of respondents for several of the bean varieties is too small to draw broad conclusions. Nevertheless, survey results generally confirm that Camp Perrin farmers sell the majority of their bean crop, usually within a few weeks of harvest. After the first season, on average, farmers who grew local beans sold 66 percent of their crop, saved 11 percent for seed, and consumed 23 percent (Table 18). Farmers who grew improved varieties sold a higher percentage of their crop, because many of them were multipliers for AgroTechnique or ORE. After the second harvest, farmers who grew local beans sold 75 percent of their crop, stored only 3 percent, and consumed 21 percent of their crop. This finding supports evidence from interviews with government officials that Haitian farmers do not store bean seed for long periods of time.

Table 18 : Average Disposition of Bean Harvests, Camp Perrin, Haiti, 2000

Variety	First Season				
	N	Sold Avg # Kg	Saved Avg # Kg	Sale Value Avg. $	Profit Avg. $
Local Black	58	40	7	113.8	74.6
Improved	23	110	5	289.4	205.0
Unknown	*2*	*5*	*2*	*19.4*	*9.2*
L'Ore 87	*2*	*71*	*0*	*177.4*	*107.0*
Tamazulapa	*12*	*80*	*9*	*183.1*	*173.8*
Arroyo Loro	*5*	*191*	*1*	*537.2*	*311.4*
Mersan	*2*	*274*	*0*	*678.9*	*419.9*
Total	81	58	6	172.4	111.6

Variety	Second Season*				
	N	Sold Avg # Kg	Saved Avg # Kg	Sale Value Avg. $	Profit Avg. $
Local Black	18	57	4	125.9	NA
Improved	13	250	4	678.6	NA
Unknown	*3*	*175*	*1*	*472.2*	*NA*
L'Ore 87	*1*	*23*	*0*	*59.2*	*NA*
Tamazulapa	*4*	*129*	*0*	*277.4*	*NA*
Arroyo Loro	*4*	*514*	*11*	*1,481.7*	*NA*
Mersan	*1*	*129*	*0*	*309.6*	*NA*
Total	31	138	4	357.7	NA

*Many farmers had not completed their second harvest at the time the survey was taken.

4.3.5.6 Willingness to Pay

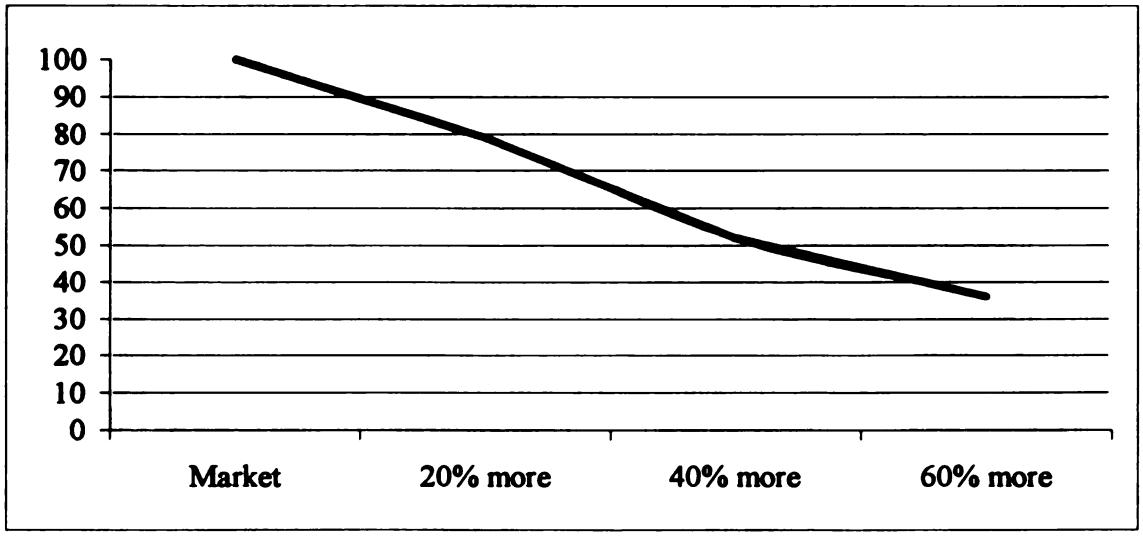
Farmer willingness to pay greater than market prices for improved beans is the key to building a successful market for improved beans. Because CIPDSA subsidizes the price of most improved beans available in the market, it is interested in understanding farmer's willingness to pay greater than market prices for improved beans. Three questions in the survey asked farmers about their willingness to pay more than the market price for improved beans. The first question asked: "if the market price for local beans is HTG 50, would you be willing to pay HTG 60 for improved beans?" Two subsequent

questions assessed the farmers' willingness to pay HTG 70 or HTG 80. These prices represent 20, 40, and 60 percent price increases over the hypothetical market price of HTG 50 (the equivalent of $0.89/Kg).

The following cumulative distributions display the results from these three questions. 'Market' indicates that the percentage of respondents willing to pay at least the market price for improved beans. The '20%' indicates the proportion of respondents willing to pay at least 20 percent more than the market price. '40%' indicates the proportion willing to pay at least 40 percent more, and a '60%' indicates those willing to pay at least 60 percent more than the current market price.

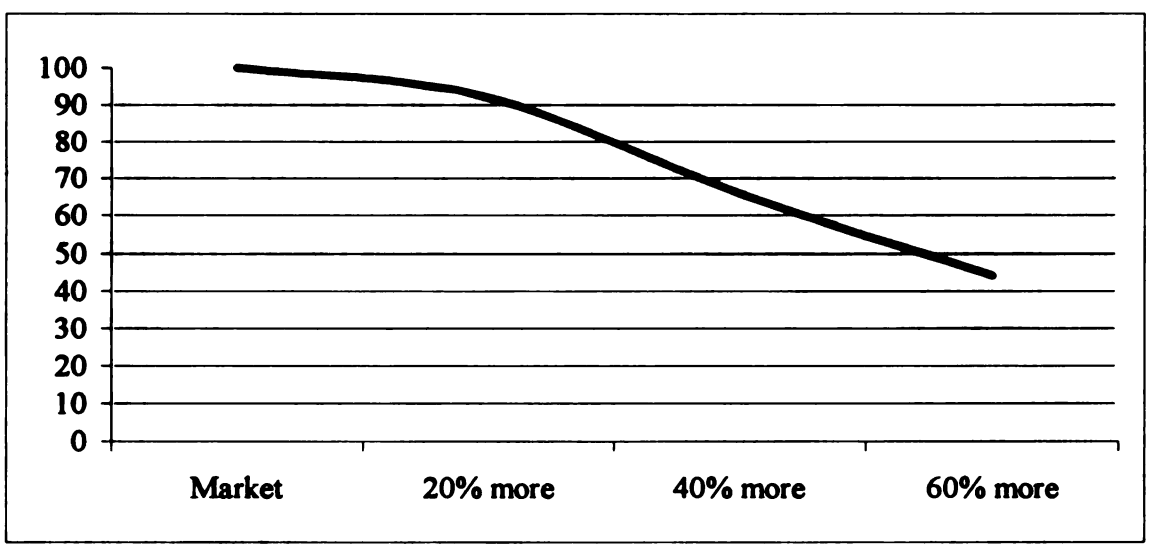
The first distribution presents the responses of 55 farmers who planted local beans in the first growing season (Figure 4). Of these, 11 answered 'Market', 15 20% more, 9 40% more, and 20 60% more.

Figure 4 : Willingness to Pay for Improved Beans Among Farmers that Planted Local Beans, Camp Perrin, Haiti, 2000



The second distribution presents the responses of 23 farmers who planted improved beans in the first growing season (Figure 5). Of these, 2 answered 'Market', 6 20% more, 5 40% more, and 10 60% more. A close examination of the two figures indicates a very similar shape and magnitude among responses. Results of a difference of means test of the two data subsets indicates no significant difference in willingness to pay between farmers who planted local beans and those who planted improved varieties (Appendix C).

Figure 5 : Willingness to Pay for Improved Beans Among Farmers that Planted Improved Beans, Camp Perrin, Haiti, 2000



4.3.6 Farmer *Groupement*

Throughout Haiti, *groupement* (lit. grouping) have evolved as a form of local grassroots development committees. The *groupement* movement traces its origins to the 'community councils', established during the Duvalier regime. Established by parish

priests and lay leaders as grassroots alternatives to the government-controlled community council system, *groupement* represent a powerful organizing force in rural Haiti. The number of *groupement* increased dramatically after the fall of 'Baby Doc' Duvalier in 1986. Many *groupement* have strong ties with national and international NGOs. Because of their political involvement in the 1987 and 1990 elections, the military brutally repressed some *groupement* following its takeover of Haiti in 1991. The return of Aristide in 1994 inaugurated a period of *groupement* expansion and development. (White and Smucker, 1998). Leaders from eight *groupement* were interviewed during the course of this study. Most of these *groupement* were formed around 1994, although one has existed since 1987.

Functions of the *groupement* vary. OPMAGAT, for example, is a large *groupement* in Camp Perrin with several hundred members. Its primary concern is increasing member income through various activities, including construction of a cassava processing facility. Primary support for this project comes from the Japanese Embassy in Port au Prince. In 1999, this *groupement* initiated a secondary activity that involved the distribution of improved bean seed obtained from the regional DDA in Les Cayes. The price that OPMAGAT and other *groupement* in Camp Perrin paid for improved beans in 1999-2000 reflected a subsidy of 50 percent below the local market price. In the future, beans obtained through the DDA will not carry this subsidy, due to the conclusion of post-hurricane Georges relief efforts.

Both ORE and AgroTechnique use existing *groupement* to find and organize their seed multipliers. *Groupement* members who purchased subsidized seed expressed appreciation for their *groupement* bringing them the opportunity to buy improved seed.

While few *groupement* have the financial resources to extend credit to their members directly, they can provide their members with credit and technical advice through links with aid donors and development agencies. Thus, AgroTechnique and ORE's seed multiplication programs represent a new way for *groupement* to provide benefit to their members (Table 20).

Table 19 : *Groupement* Interviewed in Survey, Camp Perrin Region, Haiti, 2000

Name	Purpose / Main Activity	Number of Members	Seed Source	Kg. Distributed
OPMAGAT	Income Activities	250+	ORE	
BIA-Nava	Road Maintenance, Cooperative Farming	60	ORE	1000
ACOJEB	Education, Canal Maintenance, Cooperative Marketing	250	AgroTech.	NA*
Éclair of Terre Rouge	Soil Conservation	15	PADF	95.5
Tèt Ansanm	Soil Conservation, Group Welfare	19	OPMAGAT	NA*
Souprien	Soil Conservation	25	PADF	100
KLS	Cooperative Field Preparation	22	ORE	250
Groupe Eleveurs de Mersan	Planting Fodder for Beef Production	25	ORE	NA*

*NA – Data not available for this group.

4.3.7 Traditional Bean Marketing: Role of *Madam Sara*

The only previous study on the bean marketing system in Haiti focused on the role of female traders known as *Madam Sara*. Although this study dates from 1973, the role of *Madam Sara* in bean marketing remains essentially unchanged. At one time or another, most local beans flow through an informal network of these traditional

marketers. *Madam Sara* travel freely around Haiti with their stock and make money through arbitrage: exploiting price differentials between markets.

4.3.7.1 *Madam Sara* in the Camp Perrin Bean Market

The main market in Camp Perrin is held each Friday, although wholesalers hold an impromptu market on Thursday evening as truckloads of goods arrive from Port au Prince and the surrounding large towns. The origin of beans in the Camp Perrin market depends on the time of year. At planting time, beans flow into Camp Perrin from other bean-producing regions for sale as seed. At harvest, the process reverses itself and beans flow out of Camp Perrin to other regions of the country for seed and consumption. At the time of the rapid appraisal (early August 2000), most farmers had just completed planting and the new harvest was more than one month in the future.

4.3.7.2 Traditional Supply of Bean Seed

Two interviews in the Thursday evening wholesale market revealed the remarkable extent of the bean trade in Haiti. The first *Madam Sara* reported that she purchased her bean stock of four 140 Kg sacks in Beaumont, a village about 30 kilometers to the north of Camp Perrin (Table 21). Despite the relatively short distance to Beaumont, the road is very rough and climbs through several mountain passes with elevations of more than 1,000 meters. This journey may take six hours or more by truck. Since Beaumont had recently completed a bean harvest, beans were selling there at $0.71 per Kg. The *Madam Sara* hoped to sell her stock in the Camp Perrin market for $1.03 per Kg. With transport between Beaumont to Camp Perrin costing $2 per 140 Kg sack, the *Madam Sara*'s potential total profit for the trip was $154. The actual market price in

Camp Perrin on Friday turned out to be $0.81 per Kg, leaving the *Madam Sara* with a likely total profit of $42.[20]

A truck driver interviewed during the Thursday night market reported transporting several sacks of beans for a *Madam Sara* from St. Marc, about 285 Km away. Like Beaumont, St. Marc had just completed a bean harvest. Transport for the beans between St. Marc and Camp Perrin cost the *Madam Sara* $4 per 140 Kg sack. The purchase price in St. Marc was $0.72 per Kg. With a sale price of $0.81 in Camp Perrin, the *Madam Sara*'s maximum total profit was about $8.

Table 20 : Rapid Appraisal of Madam Sara Trading Costs, Camp Perrin, Haiti, August 2000

Trader's Origin	Distance to C. Perrin Km	Quantity For Sale Kg	Purchase Cost Total $	Transport Cost Total $	Maximum Revenue Total $	Maximum Profit Total $
Camp Perrin	0	28	25	0.00	30	5
Beaumont	30	560	400	7.84	450	42
Port au P	200	140	112	1.47	125	11
Port au P	200	420	322	15.54	337	(0.42)
Jameson	250	504	360	14.87	405	30
St. Marc	285	140	100	3.99	112	9

The small apparent profits of the *Madam Sara* do not appear to justify marketing beans. Murray and Alvarez's study of *Madam Sara* solves this puzzle --*Madam Sara* use different sizes of marmit for buying and selling (Murray and Alvarez, 1973). Even a small difference in volume will increase a *Madam Sara*'s ability to profit from her trading activities.

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[20] By comparison, the legal Haitian minimum wage is approximately $1.50 per day.

Although the four Friday market interviews in Camp Perrin focused on a number of small-volume *Madam Sara* and individual local retailers, there were also many local women each selling fewer than 10 Kg of beans. The incredible reach of the *Madam Sara* became apparent during these interviews. Three of the four people interviewed on Friday traveled more than 200 Km. from the place of purchase to Camp Perrin with their stock. The magnitude of activity and the narrow potential profit margins indicates the presence of a well-developed informal information system.

4.4 Transaction Costs in the Subsector

The Haitian bean subsector consists of four component stages: varietal development, seed production and multiplication, seed processing and storage, and seed sales and distribution. Two parallel tracks exist within the subsector: the traditional and the modern seed system. In the traditional seed system, farmers are the sole providers of varietal development, production, and processing/storage operations, while *Madam Sara* dominate bean-marketing functions. Farmers internalize the vast majority of transaction costs in this vertically integrated system, and have few alternatives for minimizing the external costs that they do encounter.

By contrast, the improved bean system is a complex and expansive structure that includes international research organizations, donor agencies and governments, the Haitian government, NGOs, private seed firms, *groupement*, farmers, and *Madam Sara*. Participants in this system often have several alternatives in the way they organize their subsector activities to minimize their transaction costs.

Douglass North notes that "the costliness of information is the key to the costs of transacting". These costs arise when measuring the valuable attributes of what is being exchanged, protecting rights, and policing and enforcing agreements (North, 1990). Information costs have a significant impact on the organization of a subsector. For example, the absence of a functioning legal system may lead contracting parties to devise their own system for adjudicating disputes. The remainder of this chapter examines how transaction costs, and information costs in particular, arise at three stages in the subsector, varietal development, seed production and multiplication, and sales and distribution, and how each these costs affect performance in the subsector.

4.4.1 Varietal Development

International organizations such as the Bean/Cowpea CRSP and CIAT introduce most new varieties of improved beans into Haiti through the CRDA's evaluation process. This arrangement appears quite cost-effective for both groups. For the cost of the seed and shipping, the Bean/Cowpea CRSP and CIAT obtain the results of Haiti-specific evaluations. In turn, the CRDA, ORE, and AgroTechnique gain access to a much greater number of bean varieties than they could afford to produce under their own breeding programs.

4.4.1.1 Transparency

Non-transparency of seed in the varietal development stage requires CRDA, AgroTechnique, and ORE to conduct expensive and time-consuming evaluations to assess the attributes of each bean line provided to them. The open cooperation of the Bean/Cowpea CRSP and CIAT minimizes some of the evaluation costs by sending

moderate quantities of improved beans to the CRDA for evaluation under a wide range of Haitian growing conditions. In return, AgroTechnique and ORE minimize their evaluation costs by using publicly funded organizations, specifically the CRDA and CIAT, to conduct all the initial research and development activities. At later stages, AgroTechnique and ORE screen process to verify that the new varieties will perform well under Haitian conditions.

4.4.1.2 Subtractability

Low subtractability of seed in the varietal development stage leads to competition between firms in the subsector to identify and multiply new varieties as quickly as possible. By working with CIAT, ORE can evaluate new varieties concurrently with the CRDA, and potentially benefit from disseminating a good variety before the CRDA completes its evaluation process. This means that AgroTechnique potentially may lag several years behind ORE in bringing the same CIAT variety to the market.

4.4.1.3 Excludability

Low excludability of seed in the varietal development stage arises because no organization patents improved beans in Haiti. Since CIAT and the Bean/Cowpea CRSP are public institutions, their products exist in the public domain. In fact, these organizations encourage farmers to adopt new varieties as part of their mission. Because ORE and AgroTechnique do not conduct their own breeding programs, they do not have patent rights over the varieties they sell. In any case, the lack of seed legislation in Haiti and the considerable effort needed to register and enforce patent rights means that one seed firm can easily acquire and sell a variety that was developed by another firm.

4.4.2 Seed Production and Multiplication

AgroTechnique and ORE multiply improved beans through individuals and *groupement*. Land is expensive in Haiti and large and contiguous tracts are very rare. By contracting with multipliers, AgroTechnique and ORE avoid having to purchase and maintain large tracts of land. This arrangement also lessens the risk that they will lose an entire crop due to locally adverse weather. On the negative side, AgroTechnique and ORE give up some control over the quality of their product. Contract farmers gain by accessing credit for seed and by obtaining high-yielding varieties. They also receive training and extension advice from AgroTechnique and ORE supervisors. On the negative side, farmers bear most of the risk for bad weather.

Most seed multipliers for AgroTechnique and ORE belong to *groupement*. Although these are farmer-run organizations, *groupement* usefully serve the interests of both farmer and seed firm. Most *groupement* have a communal meeting place and at least one *groupement* had a communal demonstration field. ORE and AgroTechnique both use these facilities to conduct meetings and provide safe storage for seed and fertilizer.

4.4.2.1 Transparency

Non-transparency in the seed production and multiplication stage creates a complex interdependency between seed company and contract farmer. Since farmers cannot assess the genetic quality of the beans given to them, and are unfamiliar with the newer varieties, they must trust the seed firm to provide them with varieties suited to the local conditions. As a relatively new entrant into the multiplication business, AgroTechnique addresses farmers' concerns by planting demonstration plots of the new

variety in the community. Prospective multipliers can then assess the quality of the variety themselves at field days held during flowering and harvest. ORE has multiplied seed in Camp Perrin for more than 10 years. The varieties that it multiplies, Tamazulapa and L'Ore 87, have good name recognition among farmers. Farmers have the opportunity to evaluate these varieties on their own since there are many local fields planted with them.

Non-transparency also extends to evaluating the quality of the farmers' multiplication effort. AgroTechnique and ORE's reputations will suffer if they sell poor quality seed to their customers. Since both ORE and AgroTechnique pay a small price premium, farmers gain financially if they add beans from another source to the improved beans. In addition to this, farmers have an interest in misrepresenting the quality of the multiplied beans, for farmers must dispose of rejected seed themselves at market prices. Thus, AgroTechnique and ORE implement time-consuming and expensive inspection processes to verify that farmers' seed is of good quality. Inspection occurs regularly, particularly at germination, flowering, and harvest. From these visits, the organization knows the approximate yield to expect from each bean field. A significant deviation from the expected harvest will signal that the farmer has succumbed to temptation. If this occurs, the seed firm will sever its relationship with the farmer.

4.4.3 Sales and Distribution

Both ORE and AgroTechnique are very concerned about the reputation their respective varieties of beans have with farmers. A severe Bean Golden Mosaic Virus (BGMV) infestation in the irrigated fields during the February 2000 growing season put a particular strain on ORE's reputation with Camp Perrin farmers, since neither of ORE's

varieties is BGMV resistant. Consequently, one farmer surveyed had lost his entire bean crop, which left the farmer in debt to ORE for the seed and fertilizer credits. AgroTechnique advertises the fact that it treats Arroyo Loro Negro with Gaucho to reduce BGMV damage. While ORE does not presently treat its seed with Gaucho, it is actively pursuing a longer-term breeding program to incorporate BGMV resistance in its bean varieties.

4.4.3.1 Transparency

Non-transparency of bean seed in sales and distribution is a primary reason why AgroTechnique and ORE have developed their own seed certification standards. The primary reason for 'allowing' seed-producing organizations to certify their own product is that Haiti has no formal seed certification process. Even if it did, the Haitian government lacks the funds to enforce seed certification. Because AgroTechnique and ORE desire good relationships with their customers, they both conduct germination tests and use identification tags on each sack that specify the lot number, bean variety and the germination rate. ORE and AgroTechnique each indicated that if a dissatisfied customer brought in a tag from a bag of their seed, that customer would receive at least a partial refund. As neither firm treats the bean seed with pesticides until immediately before sale, they can sell seed with poor germination as grain in the market to recover at least a portion of their multiplication costs.

Low transparency also leads CIPDSA and aid organizations such as CARE to buy as much of their improved beans as possible from AgroTechnique and ORE. While other organizations have produced bean seed for sale to CIPDSA in the past, quality problems and low yields convinced CIPDSA to only use reliable vendors such as AgroTechnique

and ORE. The premium price CIPDSA pays for improved bean seed lowers the incentive of either ORE or AgroTechnique to misrepresent their product. On the other side of the coin, several farmers in one village mentioned that the ORE's improved bean seed distributed by a particular aid organization had a very poor germination rate. Inquiry with ORE revealed that the aid organization in question had stored the seed in a sealed truck for a considerable period. ORE, which is a member of CIPDSA, can use its voice within CIPDSA to ensure that proper storage protocols are used.

4.4.3.2 Excludability

Due to the high excludability of bean seed as a consumable good, AgroTechnique and ORE do not use *Madam Sara* as part of a broader sales network. Both organizations felt that *Madam Sara* would re-package their seed for small-volume sales or damage it during transport or storage. An additional and very real risk is that *Madam Sara* might attempt to wash the pesticide treatment off the improved beans and sell it as food. Since many insecticides, such as the Gaucho that AgroTechnique uses, are systemic, simply washing the seed will not remove the pesticide. In keeping with its non-profit status, ORE does occasionally sell improved bean seed to individual walk-in customers at the local market price. However, since selling bean seed at this price means that ORE loses money, it does not encourage individual farmers to buy their seed directly from their facility.

CHAPTER 5

SUMMARY AND CONCLUSIONS

5.1 Summary

The population explosion in the latter half of the 20th Century has required extraordinary increases in agricultural production to supply food and other agricultural products for human consumption. Over the past 40 years, increased food production has come more from agricultural intensification --producing more per hectare-- than from agricultural extensification --planting more land. Improved plant genetics, along with fertilizers and pesticides are the three principal technologies behind the broad success of this 'green revolution'. However, uneven distribution of these intensification technologies, particularly among farmers in developing nations, makes this success a shallow one.

Extreme poverty limits farmers' access to intensification technologies and traps them in a hopeless situation: rising out of poverty requires greater farm income, which requires money to invest in new technologies. Political and economic instability deepens the technology trap by smothering private industry and enervating public institutions. To counteract these effects, NGOs and donor nations seek to replace missing or ineffective government and private sector functions. They accomplish this by funding agricultural research, promoting the growth of domestic markets and industry, and subsidizing agricultural inputs to farmers. Donors and NGOs place a particular emphasis on varietal development --the keystone agricultural technology that allows farmers to bridge the gap between extensive and intensive agriculture.

5.1.1 Purpose of the Study

Wracked by decades of economic and political turmoil, the Caribbean nation of Haiti currently relies almost exclusively upon donor and NGO programs to replace many functions typically performed by government, including promoting economic development in rural areas. Because beans play an important role in Haiti's rural economy and in the diet of urban and rural Haitians, many donor and NGO assistance programs focus on increasing farmers' access to and use of improved beans. However, to strengthen the private market for improved beans and move away from large and permanent subsidies, donors and the government of Haiti need to understand farmer demand for improved beans and how the market situation affects their efforts.

5.1.2 Data Sources and Methodology

This study uses the subsector analysis approach advanced by Shaffer to describe the Haitian improved bean market and provide insights how government, donors, NGOs, and private interests currently work together. To accomplish this, the study presents results of interviews with Haitian government officials, a private company, a Haitian NGO, and 83 bean farmers conducted during the summer of 2000. Building upon the insights of Commons, Coase, Williamson, and later generations of institutional economists, this study describes the major sources of high information costs in the market and how these costs influence the organization of activities in and performance of the improved bean subsector.

5.1.3 Subsector Relationships

Government's chronic neglect of agriculture means that Haiti does not have a national bean-breeding program and that genes from Haitian land-races are not available in most varieties of improved beans. Despite this, Haitian farmers are able to access genetic material from around the Caribbean and Central America through linkages with Bean/Cowpea CRSP, PROFRIJOL, and CIAT bean breeders. These organizations introduce most varieties of improved beans into Haiti in partnership with the Center for Agricultural Research and Development (CRDA) in the Haitian Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR). The CRDA performs initial evaluation of the new varieties and then makes available promising varieties to ORE and AgroTechnique for additional testing, multiplication and sale.

Three attributes of improved beans, non-transparency, low subtractability, and low excludability, lead to high information costs in the subsector. The study found that ORE and AgroTechnique respond to these transaction costs by internalizing most of their seed production activities, such as purchasing, processing, and storage. Because chronic political turmoil has eroded confidence in the Haitian legal system, these organizations prefer to structure their external transactions around informal, long-term personal relationships, rather than through official contracts and formal relationships.

One consequence of this informal transaction system is that seed firms, farmers, and researchers depend upon intermediaries to help enforce agreements, disseminate information, and monitor behavior. Because they represent large numbers of farmers and have strong incentives to satisfy transacting parties, *groupement* are the most important intermediaries in the subsector. Through *groupement*, seed firms gain access to local

storage facilities, distribution points, and farmers. In turn, farmers use *groupement* to access the improved seed, pesticides, fertilizer, loans, and technical advice offered by NGOs and seed firms.

The study finds that subsidies at the research and development phase --in which the Bean/Cowpea CRSP, PROFRIJOL, and CIAT absorb varietal development costs-- and at the distribution level, subsidized by the European Union, allow ORE and AgroTechnique to profitably produce improved beans. Similarly, the lack of government regulation in the industry allows seed firms wide latitude in the way they conduct their operations and respond quickly to new ideas and technologies. 'Self-certified' seed is one example of the flexibility that firms have in the standards that they chose to follow.

5.1.4 Farmer Demand for Beans

Survey results indicate that most farmers purchase bean seed because they need seed for planting, want seed with a better germination rate, or seek a variety with a better yield. Farmers reported that they purchase local varieties because they are familiar with the variety and think the seed will grow well, while those who purchase improved beans do so because they appreciate the genetic or physical qualities of the beans or have previous experience with the variety. Market purchases are the primary source of farmers' bean seed for the first growing season, while self-stored beans are the most important source in the second growing season. The overall appearance, color, and size of the bean are important factors that farmers consider before purchasing them.

One surprising finding is that farmers are willing to pay higher than market prices for improved beans. This finding holds true, even for those farmers who did not plant improved beans in 2000.

5.2 Policy Implications and Recommendations

5.2.1 Varietal Development

Long standing political and economic instability means that Haitian government agencies cannot undertake the long-term financial commitments that activities such as bean breeding require. To date, international donors have responded to this problem by channeling funds through Haitian and international NGOs. One practical consequence of this funding deficit is that Haiti depends almost entirely upon international research organizations to develop new varieties of improved beans that are suitable for Haitian agricultural conditions. As scientific advances make plant breeding an increasingly expensive and specialized task, having these organizations conduct most bean breeding is a cost-effective arrangement for the Haitian government. Using research linkages with several different international organizations to access new varieties, rather than developing uniquely Haitian beans, potentially allows the CRDA to rapidly introduce many different varieties of beans into the Haitian market. The successful introduction of Arroyo Loro Negro from the Dominican Republic illustrates this point.

One important consideration for the Haitian government is how to strengthen existing relationships with international bean research organizations and increase their use of Haitian genetic material. Although the Haitian climate is not unique to the Caribbean or Central America, the wide dispersion of seed through the markets indicates that varieties of beans best suited to Haitian farmers' needs must grow well under a wide range of growing conditions and technologies. Inevitably, this requires that international bean breeders have access to Haitian genetic stock. Modest expansion in the ability of

the CRDA bean researcher to gather and characterize Haitian varieties with promising genetics is one way to reach this objective.

5.2.2 Seed Production

The dwindling numbers of BIAs and UPSAs demonstrate that the Haitian government must be willing to commit resources to train BIA and UPSA personnel and to underwrite their startup costs (and possibly much more) if the effort is to succeed. In reality, the government cannot afford to maintain these programs. The essential question for the Haitian government is how to use scarce resources effectively. Creating input provision systems that compete with, and weaken the private sector simply make little sense. A better solution is to find ways to work together with private industry to reduce marketing costs and improve farmer access to inputs.

Through contracting with farmers for bean multiplication, AgroTechnique and ORE impact Haitian agriculture far beyond the immediate financial compensation that farmers receive when they sell their seed crop. In 2000, AgroTechnique and ORE used more than 500 farmers for bean multiplication. As part of their agreement with AgroTechnique and ORE, these farmers received training and improved beans on credit, and those who multiplied for ORE also received a 50 percent credit towards their fertilizer purchases. Additionally, AgroTechnique and ORE technicians visited each farmer's bean field at least three times each growing season to check for disease and other problems with the crop. In effect, AgroTechnique and ORE have created a *de facto* extension service that replaces several functions of the understaffed government extension service. Although the benefits of these relationships do not extend directly to every farmer in the community, the cumulative effect of long-term and intensive

interaction with farmers who have multiplied beans will contribute to increasing agricultural productivity.

Currently, Haitian seed firms produce seed using their own 'self-certification' standards. These standards are generally consistent with those adopted by many nations. Future plans by the Haitian government to certify seed through the National Seed Service (SNS) recognize that seed firms may chose to ignore their own standards when convenient, and that government has a role in reducing consumer information costs. However, these plans may overestimate the improvement that a formal certification process will have on the quality of seed sold. Although AgroTechnique and ORE may have slightly different motivations for doing so, they both appear eager to provide the best quality seed possible. To induce farmers to purchase its bean varieties, AgroTechnique must sell beans with some combination of physical and genetic qualities clearly superior to those available in the market. For its part, ORE strives to produce high quality seed as part of its broader social goal of improving farmer income. While a formal seed certification process may theoretically improve the quality of the seed that AgroTechnique and ORE sell, the Haitian government is unlikely to have the resources to implement or enforce a formal process. A more reasonable approach may be to enact general regulations that require truth in labeling. Under this regime, firms set their own standards, but are held accountable if the product does not perform as described.

5.2.3 Storage

Unlike AgroTechnique, ORE does not plan to increase the quantity of beans it multiplies each year. One reason is that ORE's limited financial resources simply do not allow expansion of its existing processing and storage facilities. Furthermore, ORE's

mission to protect the watershed of the Ravine du Sud gives it little reason to multiply more improved bean seed than local programs require. This situation suggests that both ORE and AgroTechnique may want to explore working together to increase farmers' access to improved beans. The scale of ORE's operation and its renewed bean breeding program means that it could contract with AgroTechnique to develop and multiply stable lines of improved beans. This specialization of tasks in the subsector would allow ORE to focus on bean breeding and direct its energy into programs that improve agricultural productivity in Camp Perrin. For its part, AgroTechnique could bring new varieties to market in less time and concentrate on national level multiplication and sales.

Any organization that wishes to sell or distribute improved beans in Camp Perrin benefits from the fact that most farmers seldom store their bean seed for more than a few months after harvest and usually purchase fresh seed in the market just before their first planting. Because farmers do not store seed, AgroTechnique should be able to convince farmers to purchase their seed directly from its retail stores or through their *groupement*. Dependence on the market for fresh seed also increases the rate at which farmers adopt new varieties. The episodic lawlessness that accompanies political instability and poverty make long term on-farm seed storage a risky and expensive option for farmers. Government agencies and NGOs should evaluate whether promoting on-farm storage or improving the operation of existing markets better serves farmers' interests.

5.2.4 Sales

At present, CIPDSA and NGOs pay higher-than-market prices to AgroTechnique and ORE to cover their costs of producing, processing, and storing improved beans. While recognizing the expense of this subsidy, CIPDSA and NGOs cite farmers' pressing

need for new technology and the Haitian government's inability to coordinate activity in the market to justify their interventions. However convenient for AgroTechnique and ORE at the present time, this subsidy may ultimately impede the development and growth of the market for improved beans. Furthermore, government and NGO initiatives that provide highly subsidized agricultural inputs to farmers undermine AgroTechnique's efforts to develop farmer demand for its products. For example, two farmers in the survey responded that improved beans should be free because they are "project" seed. Farmers must not equate improved seed with free seed. A more sustainable solution may be to reimburse organizations a portion of their marketing costs. The amount of the reimbursement could decrease each year to slowly wean farmers and firms off the subsidy. As long as the current subsidy is in place, AgroTechnique has little incentive to aggressively market improved beans through its stores.

The Haitian government and NGOs need to examine how disaster relief impacts the viability of private seed firms. Future relief efforts should seek to include private firms rather than weakening them through giveaway programs. For example, AgroTechnique lost a major portion of its hand tool business after hurricane Georges when donors gave away thousands of the small sickles used to harvest rice. Likewise, fertilizer sold at a subsidy through government channels competes directly with fertilizer already available through private sources. A voucher system that allows farmers to purchase seed and other inputs in their local markets and stores is one way to dispense disaster relief efficiently and strengthen existing agricultural input markets.

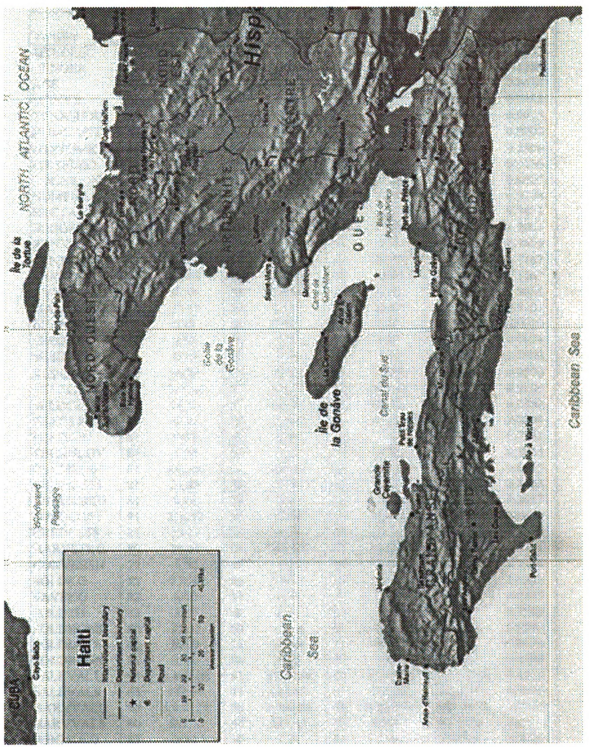
5.3 Study Limitations and Implications for Future Research

Because of the rapid reconnaissance approach of the survey, data collection for farmers occurred in only one area of Haiti. Therefore, survey results may not directly reflect conditions and attitudes in other Haitian regions. Future research should focus on gaining a better understanding of the bean production and seed system in northern Haiti and collecting data from more specific growing seasons. A study that focuses on regional differences should also analyze bean prices in the principal markets and the interactions between these markets.

Future study should also examine factors that constrain farmers' yields. Soil erosion, for example, may have a much more severe impact on yields than lack of quality inputs. This does not suggest that development of improved varieties is irrelevant, merely that increasing yields may require more than simply encouraging farmers to plant improved bean varieties.

APPENDIX A.

MAP OF HAITI



APPENDIX B.

1st Season Survey Variables and Proportions of Means Test Results

	Total		Local		Improved		Proportions	
Variable	N	Mean	N	Mean	N	Mean	SE	p-value
SITEDESC	83	0.64	58	0.69	23	0.52	0.1181	0.1552
GENDER	83	0.30	58	0.34	23	0.17	0.1125	0.1288
AGE	83	48.39	58	48.50	23	47.30	2.7276	0.6626
SCHOOL	83	0.69	58	0.62	23	0.87	0.1138	0.0288
YEARSEDU	82	4.73	57	3.62	23	7.61	1.1578	0.0015
HUMCAPIT	83	9.52	58	8.41	23	12.34	1.0830	0.0009
MINTOMKT	81	80.12	56	78.04	23	85.65	6.5496	0.2506
MKTFREQ	83	44.96	58	48.33	23	33.61	5.8801	0.0150
LOCATION	83	0.54	58	0.58	23	0.38	0.0729	0.0080
NUMFIELD	81	1.60	58	1.60	23	1.61	0.1960	0.9788
HECTARES	80	1.39	57	1.32	23	1.55	0.2448	0.3471
IRRIGATE	81	0.37	58	0.33	23	0.48	0.1190	0.2054
RENTFLD	81	0.32	58	0.34	23	0.26	0.1150	0.4655
RENTCOST	81	359.51	58	228.84	23	689.02	283.9247	0.1167
RENTCST$	81	17.98	58	11.44	23	34.45	14.1962	0.1167
AVYRSOWN	81	12.96	58	13.48	23	11.66	3.1448	0.5654
MAXYROWN	81	13.19	58	13.69	23	11.91	3.1498	0.5751
BEANVAR	81	0.65	58	0.00	23	2.30	0.2978	0.0000
SEEDSRC	81	1.98	58	1.50	23	3.17	0.4951	0.0014
SEEDTYPE	81	0.28	58	0.00	23	1.00	0.1111	0.0000
KGPLANT	80	16.82	57	14.68	23	22.13	3.7902	0.0570
SEEDCOST	80	575.26	57	478.78	23	814.35	156.2419	0.0389
SEEDCST$	80	28.76	57	23.94	23	40.72	7.8121	0.0389
FERTILZE	81	0.52	58	0.52	23	0.52	0.1231	0.9709
PESTICID	81	0.41	58	0.40	23	0.43	0.1211	0.7522
TECHNLGY	81	1.30	58	1.24	23	1.43	0.3504	0.5844
CHEMCOST	81	426.06	58	358.94	23	595.33	184.9236	0.2103
CHEMCST$	81	21.30	58	17.95	23	29.77	9.2462	0.2103
CHEMCRED	81	0.21	58	0.12	23	0.43	0.1003	0.0017
CREDCOST	81	206.12	58	15.59	23	686.61	220.3990	0.0059
CREDCST$	81	10.31	58	0.78	23	34.33	11.0199	0.0059
HARVSTKG	80	79.67	58	60.93	22	129.06	34.5082	0.0591
CONVERSN	79	4.50	57	4.07	22	5.60	1.2627	0.2324
SOLDKG	82	57.74	58	39.95	22	109.88	30.6265	0.0315
SAVEKG	83	6.10	58	6.71	23	5.10	3.3780	0.6375
SOLDTO	83	2.47	58	2.60	23	1.57	0.7147	0.1509
SOLDHOME	80	31.33	58	13.48	22	78.40	27.9399	0.0293
SOLDLOCL	81	20.72	58	24.84	23	10.32	7.3781	0.0526
SOLDREGN	81	1.40	58	1.62	23	0.84	1.8286	0.6700
SALEVALU	63	3,447.00	42	2,276.68	21	5,787.65	1,612.3894	0.0400
SALEVAL$	63	172.35	42	113.83	21	289.38	80.6195	0.0400
HARVVALU	80	3,631.29	58	2,550.54	22	6,480.54	1,743.4608	0.0332
HARVVAL$	80	181.56	58	127.53	22	324.03	87.1730	0.0332
WHOSOLD	83	2.81	58	3.21	23	1.26	0.6384	0.0032

1st Season Survey Variables and Proportions of Means Test Results, continued

	Total		Local		Improved		Proportions	
Variable	N	Mean	N	Mean	N	Mean	SE	p-value
TIMESTOR	56	2.61	39	2.31	17	3.29	0.6223	0.1255
PROFIT	81	2,232.73	58	1,492.24	23	4,100.08	1,380.3617	0.0701
PROFIT$	81	111.64	58	74.61	23	205.00	69.0181	0.0701
WHYBUY	74	0.78	52	0.54	21	1.33	0.4795	0.1078
WHYVAR	67	3.82	47	3.32	19	5.26	0.9085	0.0403
PREVINFO	68	1.62	51	1.29	16	2.75	0.6128	0.0255
INFOACC	34	1.00	19	1.00	15	1.00	0.0000	NA
EXPECTI	74	1.76	53	1.74	21	1.81	0.1591	0.6459
EXPECTII	30	1.83	23	1.83	6	1.83	0.1956	0.9713
FINDDEMO	35	0.11	17	0.18	18	0.06	0.1076	0.2611
FINDFDAY	35	0.11	17	0.12	18	0.11	0.1076	0.9516
FINDGPMT	35	0.60	17	0.71	18	0.50	0.1657	0.2140
FINDFRND	35	0.14	17	0.12	18	0.17	0.1183	0.6787
FINDOTHR	35	0.34	17	0.18	18	0.50	0.1605	0.0439
WHYPRICE	50	0.06	43	0.07	6	0.00	0.1045	0.5043
WHYAPPAR	50	0.74	43	0.74	6	0.67	0.1924	0.6870
WHYCLEAN	50	0.14	43	0.14	6	0.17	0.1525	0.8588
WHYREPET	50	0.06	43	0.05	6	0.17	0.1045	0.2501
WHYREPUT	50	0.02	43	0.02	6	0.00	0.0616	0.7059
WHYCOLOR	50	0.46	43	0.47	6	0.33	0.2168	0.5432
WHYSIZE	50	0.60	43	0.58	6	0.67	0.2142	0.6906
SATISFCT	49	0.88	42	0.86	6	1.00	0.1443	0.3223
WILLPAY	80	1.78	55	1.69	23	2.00	0.2688	0.2562
BUYFUTUR	79	0.95	54	0.93	23	1.00	0.0553	0.1801
BUYVARTY	78	2.46	53	1.79	23	4.22	0.8444	0.0066
BUYQUANT	76	20.73	52	18.93	22	25.50	4.9466	0.1934
TOTCOST$	81	77.99	58	53.69	23	139.27	35.8394	0.0245
REVPER$	81	2.78	58	2.91	23	2.46	0.5004	0.3716
PROFITS$	81	101.33	58	73.83	23	170.67	65.7040	0.1525
PROFPER$	81	1.78	58	1.91	23	1.46	0.5004	0.3716
SREVPER$	81	1.63	58	1.55	23	1.83	0.3986	0.4913
SPROF$	81	56.06	58	28.74	23	124.95	55.6287	0.0965
SPROFPR$	81	0.63	58	0.55	23	0.83	0.3986	0.4913

APPENDIX C.

Results of Difference of Means/Proportions Test on Willingness to Pay Categories

Category	# Responses	Average	SE	Difference	z-Statistic	p-Value
			Comparison by Type			
Local	Compares 1 to 2					
0	11	0.1667	0.0925	0.1130	1.2215	0.2219
1	15	0.2692	0.1101	0.0119	0.1077	0.9143
2	9	0.1795	0.0953	(0.0538)	(0.5641)	0.5727
3	20	0.3846	0.1208	(0.0711)	(0.5889)	0.5559
Improved						
0	2	NA	NA	NA	NA	NA
1	6	NA	NA	NA	NA	NA
2	5	NA	NA	NA	NA	NA
3	10	NA	NA	NA	NA	NA

APPENDIX D.

BEAN FARMER SURVEY

Respondent should be the person who made the purchasing decisions for the household or is most familiar with the household farming data. Code site description (Plain = 0, Mountain = 1). Give best estimate of altitude if possible.

Date (d/m/y) :
Time :
Village / Town :
Site description :

CONSENT STATEMENT:

My name is Will Shields. I am conducting a study of bean production and bean seed marketing in Haiti. I'd like to ask you some questions about your bean production activities. The information that you provide will be used to document the decisions that farmers make when they buy their bean seed and plant their fields. The information that I collect from you and other bean farmers in the area will be used to complete my M.Sc. thesis in the department of Agricultural Economics at Michigan State University.

This study is sponsored by the Haitian ministry of agriculture in collaboration with the Bean/Cowpea Collaborative Research and Support Project (CRSP) at Michigan State University in East Lansing, Michigan USA.

Your participation is VOLUNTARY. The interview will take about 30 minutes to complete. You are free to NOT ANSWER any of the questions that I will ask you. However, I hope that you will agree to answer my questions, as your answers will help me to better understand the bean farming system in Haiti and farmers' bean seed purchasing decisions. All of the information that you provide will be kept CONFIDENTIAL. This means that your answers to my questions will not be shown to anyone else. No one will know your answers but me.

Do you agree to be interviewed? ..... (No = 0, Yes = 1) _____

1 BACKGROUND INFORMATION:

1.1 **What is your name?** ..... _____
1.2 *Gender of respondent* : ..... (Male = 0, Female = 1) _____
1.3 **How old are you?** ..... _____
1.4 **How many people in your family depend upon the crops that you grow?** ..... _____
1.5 **Have you attended school?** ..... (No = 0, Yes = 1) _____
1 *If YES,* **How many years of schooling have you completed?** ..... _____
1.6 **How many members older than 15 years assist you with bean farming?** ..... _____
1.7 **In what town is the market where you buy beans?** ..... _____
1.8 **In what town is the market where you sell beans?** ..... _____

1.9 **How long does it take you to travel on foot from your home to that market?** ..... _____

1.10 **How many times a month do you visit this market?** ..... _____

1.11 **What are the times of year that you normally plant and harvest your fields?**

1 (First growing season) ..... (planting | harvest) _____ | _____

2 (Second growing season) ..... (planting | harvest) _____ | _____

3 (Third growing season) ..... (planting | harvest) _____ | _____

1.12 **In the (first) growing season, what FIELD crops did you plant?**

1 (Beans) ..... (No = 0, Yes = 1) _____

2 (Sorghum) ..... (No = 0, Yes = 1) _____

3 (Maize) ..... (No = 0, Yes = 1) _____

4 (Sweet Potato) ..... (No = 0, Yes = 1) _____

5 (Other) .....(Specify) _____

1.13 **When did you last use commercial fertilizer?** ..... (Year) _____

If YES,

1 **Where do you usually purchase the fertilizer?**
.....(Market=0, Store=1, Friend/Family=2, Groupement=3, Other (specify)) _____

2 CROPS IN FIRST GROWING SEASON:

First I would like to ask you about the field crops that you planted in (first) growing season. If you do not remember an exact number for any of my questions, you may give me an estimate of that number.

2.1 **What was the date that you planted your fields for the (first) growing season?**
..... _____

2.2 **How many different bean fields did you plant in the (first) growing season this year?**
..... _____

1 **How many carreau did you plant with beans in each field?** .....(carreau)

1	2	3

2 **Which, if any, of these fields did you irrigate?** .....(No = 0, Yes = 1)

1	2	3

2.3 **Who owns each of the fields that you plant?**

1 **First field**..... (Self=0, Family member=1, Landlord=2, Other(specify))_____

2 **Second field**..... (Self=0, Family member=1, Landlord=2, Other(specify))_____

3 **Third field**..... (Self=0, Family member=1, Landlord=2, Other(specify))_____

If not self, then ask for each field that is appropriate.

4 **What are the conditions for your use of the 1st field?** ..... _____

5 **What are the conditions for your use of the 2nd field?** ..... _____

6 **What are the conditions for your use of the 3rd field?** ..... _____

If respondent indicates that he owns a field:

7 **How many years have you owned each field?**..... (years)

1	2	3

2.4 **What bean varieties did you plant in each field?**.....(if local bean, specify color)

2.5 **Where did you obtain each of these bean varieties?** (Market=0, Agrotechnique=1, CIPDSA=2, ORE=3, Friend/Neighbor=4, Groupment=5, Self=6, Other(specify))

1	2	3

If bean seeds were purchased

1 **What was the price per marmit that you paid?** ..... (gourdes)

1	2	3

2.6 **How many marmit of beans did you plant in each field?** ..... (marmit)

1	2	3

2.7 **Were any of your beans planted in association with another crop?** .....(No=0,Yes=1)

1	2	3

If YES,

1 **What was the crop each bean variety was associated with?**.....
.....(Maize=0, Cassava=1, Sorghum=2, Banana=3, Potato=4, Other(specify))

1	2	3

2.8 **Did you use commercial fertilizer in any of your bean fields in the (first) growing season?** .....(No=0, Yes=1)

If NO,

1 **Why not?** _____

_____

If YES,

2 **What was the amount of fertilizer that you used on each field?** .....(Kgs|marmit|sack)

1	2	3

3 **What type of fertilizer did you buy?**.....(type) _____

4 **How much did you pay for the fertilizer?**..... (cost-Gdes.) _____

2.9 **Did you treat any of your bean SEEDS with a pesticide?** ..... (No=0, Yes=1) _____

If NO,

1 **Why not?**..... _____

2.10 **Did you treat any of your bean PLANTS with a pesticide?** ..... (No=0, Yes=1) _____

If NO,

1 **Why not?**..... _____

If YES,

2 **Which bean fields were treated with the pesticide?**.....(No=0, Yes=1)

1	2	3

3 **What is the name of the pesticide that you used?**..... (local or trade name) _____

4 **What was the total cost that you paid for the pesticide?**..... Gdes. _____

5 **Do you think that using the pesticide improved that bean crop?**.....(No=0, Yes=1)

1	2	3

2.11 **Have you received a loan or credit in the (first) growing season?** .. (No=0, Yes=1) _____

If YES,

1 How much was the loan or credit:..... (for each item)

1 **for Seeds?**..... Gdes. _____

2 **for Fertilizer?**..... Gdes. _____

3 **for Pesticides?**..... Gdes. _____

2 **From whom did you obtain the loan or credit?**.....(name) _____

Now I am going to ask you about the yield from the beans that you planted in the (first) growing season.

2.12 **How many marmit of beans have you harvested from each field?** ..... (marmit)

1	2	3

2.13 **How many marmit of each variety have you:**

1 **Sold?** ..... (marmit)

1	2	3

2 **Saved for planting in the next season?** ..... (marmit)

1	2	3

If respondent indicates that beans were sold:

3 **Who purchased each bean variety that you sold?**
.....(madam sara=0, sékrétè=1, other(specify))

1	2	3

4 **When did you sell each bean variety?** ..... (give date)

1	2	3

5 **How many marmit of each variety did you sell:**

1 **From your home?** ..... (marmit)

1	2	3

2 **In the market that you usually visit?** ..... (marmit)

1	2	3

3 **In a regional market?** ..... (marmit)

1	2	3

6 **What was the price per marmit for each variety that you sold?** ..... (gourdes)

1	2	3

7 **Who sold each bean variety?** .....
.....(Self=0, Husband=1, Wife=2, Family=3, Neighbor=4, Other(specify))

1	2	3

8 **How did you sell each variety of beans, in cash or on credit?** .....(cash=0, credit=1)

1	2	3

If on credit,

1 **How much time usually passed before you received your money?** .....(days) _____

2.14 **How do you usually store your bean seeds for the next planting season?** .....

_____

_____

2.15 How long do you usually store your bean seeds?..... _____

2.16 **What problems do you typically have with the bean seeds you store for planting?**

_____

_____

2.17 **For the bean fields that you planted, what problems did you have that reduced their yield?** _____

_____

3 CROPS IN SECOND GROWING SEASON:

Now I am going to ask you about the crops that you planted in the (second) growing season. If you do not remember an exact number for any of the questions, you may give me an estimate of that number.

3.1 **When did you plant your fields for the (second) growing season?**....._____

3.2 **How many bean fields did you plant in the (second) growing season this year?** .... _____

If ZERO, ask following, then skip to section 4

1 **Why didn't you plant beans in the (second) growing season?** _____

_____

3.3 **How many carreau did you plant with beans in each of these fields?**.....(carreau)

1	2	3

1 **Which, if any, of these fields did you irrigate?** .....(No = 0, Yes = 1)

1	2	3

3.4 **What bean varieties did you plant in each field?**.....(if local bean, specify color)

1	2	3

3.5 **Where did you obtain each of these bean varieties?** (Market=0, Agrotechnique=1, CIPDSA=2, ORE=3, Friend/Neighbor=4, Groupment=5, Self=6, Other(specify))

1	2	3

If bean seeds were purchased

1 **What was the price per marmit that you paid?**..... (gourdes)

1	2	3

3.6 **How many marmit of beans did you plant in each field?**..... (marmit)

1	2	3

3.7 **Were any of your beans planted in association with another crop?** .....(No=0,Yes=1)

1	2	3

If YES,

1 **What was the crop each bean variety was associated with?**.....
.....(Maize=0, Cassava=1, Sorghum=2, Banana=3, Potato=4, Other(specify))

1	2	3

3.8 **Did you use commercial fertilizer in any of your bean fields in the (first) growing season?**.....(No=0, Yes=1)

If NO,

1 Why not? ..... _____

_____

If YES

2 **What was the amount of fertilizer that you used on each field?** .....(Kgs|marmit|sack)

1	2	3

3 **What type of fertilizer did you buy?**.....(type) _____

4 **How much did you pay for the fertilizer?**..... (cost-Gdes.) _____

3.9 **Did you treat any of your bean SEEDS with a pesticide?** ..... (No=0, Yes=1) _____

If NO,

1 **Why not?**..... _____

3.10 **Did you treat any of your bean PLANTS with a pesticide?** ..... (No=0, Yes=1) _____

If NO,

1 **Why not?**..... _____

If YES,

2 **Which bean fields were treated with the pesticide?**.....(No=0, Yes=1)

1	2	3

3 **What is the name of the pesticide that you used?** ..... (local or trade name) _____

4 **What was the total cost that you paid for the pesticide?** ..... Gdes. _____

5 **Do you think that using the pesticide improved that bean crop?**.....(No=0, Yes=1)

1	2	3

3.11 **Have you received a loan or credit in the (second) growing season?**

..... (No=0, Yes=1) _____

If YES,

1 **How much was the loan or credit:** ..... (for each item)

1 **for Seeds?**..... Gdes. _____

2 **for Fertilizer?**..... Gdes. _____

3 **for Pesticides?** ..... Gdes. _____

2 **From whom did you obtain the loan or credit?** .....(name) _____

Now I am going to ask you about the yield from the beans that you planted in the (second) growing season.

3.12 **How many marmit of beans have you harvested from each field?** ..... (marmit)

1	2	3

3.13 **How many marmit of each variety have you:**

1 **Sold?** ..... (marmit)

1	2	3

2 **Saved for planting in the next season?**..... (marmit)

1	2	3

If respondent indicates that beans were sold:

3 **Who purchased each bean variety that you sold?**

.....(madam sara=0, sékrétè=1, other(specify))

1	2	3

4 **When did you sell each bean variety?**..... (give date)

1	2	3

5 **How many marmit of each variety did you sell:**

1 **From your home?**..... (marmit)

1	2	3

2 **In the market that you usually visit?** ..... (marmit)

1	2	3

3 **In a regional market?**..... (marmit)

1	2	3

6 **What was the price per marmit for each variety that you sold?**..... (gourdes)

1	2	3

7 **Who sold each bean variety?**.....
(Self=0, Husband=1, Wife=2, Family=3, Neighbor=4, Other(specify))

1	2	3

8 **How did you sell each variety of beans, in cash or on credit?** .....(cash=0, credit=1)

1	2	3

If on credit,

1 **How much time usually passed before you received your money?**
.....(days) _____

3.14 **How do you usually store your bean seeds for the next planting season?** .....
_____
_____

3.15 **How long do you usually store your bean seeds?**..... _____

3.16 **What problems do you typically have with the bean seeds you store for planting?**
_____
_____

3.17 **For the bean fields that you planted, what problems did you have that reduced their yield?** _____
_____

4 PURCHASED SEED QUESTIONS:

This section should be completed only if respondent has indicated that bean seeds were purchased in either season, otherwise skip to section 5.

4.1 **Why did you decide to purchase bean seeds for the (first) or (second) growing season?**_____
_____

4.2 **Why did you choose to purchase this bean variety?** _____
_____

4.3 **What information did you have about the bean variety before you purchased it?**
_____
_____

4.4 **Do you think that the information about the bean seed was accurate?**
.....(No=0, Yes=1) ____

If NO,

1 **What information do you think was inaccurate?**_____
_____

4.5 **For each of the bean seed varieties that you purchased, was the yield from the (first) growing season higher, about the same, or lower than you expected?**

1 **1st Variety**.....(Higher=0, Same=1, Lower=2) _____
2 **2nd Variety**.....(Higher=0, Same=1, Lower=2) _____

4.6 **For each of the bean seed varieties that you purchased, was the yield from the (second) growing season higher, about the same, or lower than you expected?**

1 **1st Variety**.....(Higher=0, Same=1, Lower=2) _____
2 **2nd Variety**.....(Higher=0, Same=1, Lower=2) _____

Ask these questions only if seeds were purchased from CIPDSA, ORE, or AgroTechnique.

4.7 **If you could buy a bag of bean seed in any quantity, what size bag would you prefer to buy?** ..... (circle one marmit | kg.) _____

4.8 **Before you planted an improved bean variety on each field how many marmit of beans did you typically harvest from each field?** .....F1____F2____F3____

1 **Was this yield for a monocropped or intercropped field?**.....F1____F2____F3____

4.9 **How did you find out about the seed that you purchased this year?**

1 (Saw demonstration plot)..... (No=0, Yes=1) _____
2 (Attended field day)..... (No=0, Yes=1) _____
3 (Through Groupement)..... (No=0, Yes=1) _____
4 (Through friend / relative / neighbor)..... (No=0, Yes=1) _____
5 (Other) ..... (specify) _____

Ask the following only if seed was purchased through CIPDSA:

4.10 **If the seed that you purchased were no longer available through CIPDSA, would you be willing to pay more money for the same quality of seed that CIPDSA sold?**
..... (No=0, Yes=1) _____

If NO,

1 **Why wouldn't you be willing to pay more?** _____
_____

4.11 **Do you have any comments about the seed that you purchased?** _____
_____
_____

Ask the following only if the respondent purchased bean seeds from the market.

4.12 **Of all the people selling beans in the market, why did you decide to buy your bean seed from a particular person?**

1 (Price of bean seed) ..... (No=0, Yes=1) _____
2 (Appearance of bean seed)..... (No=0, Yes=1) _____
3 (Cleanliness of bean seed) ..... (No=0, Yes=1) _____
4 (Previous transactions with seller) ..... (No=0, Yes=1) _____
5 (Reputation of seller)..... (No=0, Yes=1) _____
6 (Color of bean seed) ..... (No=0, Yes=1) _____
7 (Size of bean seed) ..... (No=0, Yes=1) _____

4.13 **Were you satisfied with the yield from the bean seeds that you purchased in the market?**..... (No=0, Yes=1) ____

1 **Why | Why not?** _____
_____

5 INTENTIONS FOR THE NEXT SEASON:

Each respondent should be asked these questions.

5.1 **If the price in the market for local bean seed was 50 gourdes for each marmit, would you be willing to pay 60 gourdes for each marmit of improved bean seed?**
..... (No=0, Yes=1) _____

1 **If the price for local bean seed was 50 gourdes for each marmit in the market, would you be willing to pay 70 gourdes for each marmit of improved bean seed?**
..... (No=0, Yes=1) _____

2 **If the price for local bean seed was 50 gourdes for each marmit in the market, would you be willing to pay 80 gourdes for each marmit of improved bean seed?**
..... (No=0, Yes=1) _____

5.2 **Do you intend to purchase bean seeds in the future?** ..... (No=0, Yes=1) ____

If NO, ask following, then skip to section 6

1 **Why not?** _____
_____

2 **From where will you obtain your bean seeds?**..... _____

If YES,

3 **For what planting season do intend to purchase bean seeds for?** .....
..... S1___S2___S3___I___

4 **What seed variety(ies) do you intend to purchase?** .....
..... 1)_____2)_____3)_____

5 **What quantity do you think that you will need of:**

1 **1st Variety**.....(in marmit) _____
2 **2nd Variety**.....(in marmit) _____
3 **3rd Variety**.....(in marmit) _____

5.3 **Do you have any additional comments regarding the availability of new bean varieties or their performance in your fields?**..._____
_____

6 POIS CONGO (PIGEON PEA) QUESTIONS:

Before we finish this survey, I have a few questions about Pois Congo.

6.1 **Have you planted Pois Congo in the last year?**..... (No=0, Yes=1) ____

If NO, ask following, then conclude interview

1 **Why not?**..... _____

If YES,

2 **In what growing season did you plant Pois Congo?**

1	2	3

3 **How many marmit of Pois Congo seed did you plant?**.....(marmit) _____

4 **From where did you obtain your Pois Congo seed?** .....
.....(Market=0, Store=1, Gift=2, Self stored=3, Groupement=4,Other(specify)) _____

If seeds were purchased:

5 **How many marmit did you buy?** .....(marmit) _____

6 **What price per marmit did you pay?**..... Gdes. _____

6.2 **What crops, if any, did you plant Pois Congo in association with?**.. _____
_____

6.3 **How many marmit of Pois Congo did you harvest?** .....(marmit) _____

6.4 **If a new Pois Congo seed could be purchased, what qualities would you be most interested in?** ..... _____

Thank you for your help with this survey. We have a small gift for you from Michigan State University to thank you for allowing us to ask you these questions.

BIBLIOGRAPHY

Bandow, D. "Help or Hindrance: Can Foreign Aid Prevent International Crises?" Cato Institute, April 25 1997.

CIPDSA (1997) Le Sous-Sector Semencier - Potentialités, Contraintes et Stratégie de son développement. Port-au-Prince, Haiti, CIPDSA, pp. 34.

Coase, R. H. "The Nature of the Firm." *Economica* 4(1937): 386-405.

Coase, R. H. "The Problem of Social Cost." *The Journal of Law and Economics* 3(1960): 1-44.

Commons, J. R. "Institutional Economics." *American Economic Review* 21(1931): 648-657.

Dominique, J. L. Interview with CIPDSA Director, July 14 2000.

Douglas, J. E. "Successful Seed Programs : A Planning and Management Guide." Westview Press.

Eveillard, J. P. Personal Communication, December 20, 2000.

Fafchamps, M., and B. Minten. "Social Capital and the Firm: Evidence from Agricultural Trade." The World Bank, September 1999.

FAO (2000) FAO STAT Database Query, 2000.

FAO (2001) FAO STAT Database Query,. 2001

Gachette, M. "Rapport de Planification de la Campagne d'Aout 2000 et Statistiques de Distribution de Semences d'Aout 1995/1996/1997/1998 et 1999." CIPDSA, Juin 2000.

Gagnon, G. "Food Security Issues in Haiti." The World Bank, August 1998.

Guiteau, P. "Statistiques de Distribution de Semences Sur les Campagnes d'Hiver 1996 / 97 / 98 et Planification de la Campagne d'Hiver 1999." CIPDSA/PNIS, October 1999.

Guzmán, J. P., A. Salehizadeh, and D. Dunn. "Haiti: Recent Economic Developments." International Monetary Fund, September 1998.

Haggblade, S. J., and M. S. Gamser. "A Field Manual for Subsector Practitioners." Development Alternatives, Inc., November 1991.

Holtzman, J. S. *Rapid Reconnaissance Guidelines for Agricultural Marketing and Food System Research in Developing Countries*. Working Paper 30. MSU International Development Papers. East Lansing: Department of Agricultural Economics, 1986.

Jaffee, S., and J. Srivastava. "Seed System Development: The Appropriate Roles of the Private and Public Sectors." The World Bank.

Jensen, H. H., S. R. Johnson, and G. Stampley. "Food Consumption Patterns in Haiti: Evidence from the Haiti Household Expenditure and Consumption Survey." Center for Agricultural and Rural Development (CARD), December 1990.

Jensen, H. H., S. R. Johnson, and G. Stampley. "Nutrition in Haiti: Evidence from the Haiti Household Expenditure and Consumption Survey." Center for Agricultural and Rural Development (CARD), December 1990.

Lundahl, M. *The Haitian Economy: Man, Land, and Markets*. London: Croom Helm, 1983.

Manigat, S. (1999) Times of Definitions and Choices: The Case of Haiti, FAO.

Morris, M. L., J. Rusike, and M. Smale (1998) Conceptual Framework, ed. M. L. Morris. Boulder, Lynne Rienner, pp. 401.

Murray, G. F., and M. D. Alvarez. "The Marketing of Beans in Haiti: An Exploratory Study." InterAmerican Institute of Agricultural Sciences, June 1973.

Nabli, M. K., and J. B. Nugent. "The New Institutional Economics and Its Applicability to Development." *World Development* 17, No. 9(1989): pp 1333-1347.

North, D. C. *Institutions, Institutional Change, and Economic Performance*. New York: Cambridge University Press, 1990.

Pray, C. E., and B. Ramaswami. "A Framework for Seed Policy Analysis in Developing Countries." International Food Policy Research Institute (IFPRI), May 1991.

Prophète, E. Personal Communication, 15 November 2000.

RESAL. "Etude d'impact du programme d"appui à la filière semence." European Food Security Network (RESAL), April 2000.

Robison, L. J., A. A. Schmid, and M. E. Siles. "Is Social Capital Really Capital?" Michigan State University, June 1999.

Rotberg, R. I. "Haiti's Past Mortgages Its Future." *Foreign Affairs* 67, No. 1(1988): 93-109.

Ruttan, V. W., and Y. Hayami (1990) Induced Innovation Model of Economic Development, ed. C. K. Eicher, and J. M. Staatz, 2nd ed. Edition. Baltimore, The Johns Hopkins University Press, pp. 97-112.

Schmid, A. A. *Property, Power, and Public Choice : An Inquiry into Law and Economics*. 2nd ed. New York: Praeger, 1987.

Shaffer, J. D. "On the Concept of Subsector Studies." *American Journal of Agricultural Economics* Vol. 55, no. No. 2(1973): 333-335.

Tripp, R. "The Institutional Conditions for Seed Enterprise Development." Overseas Development Institute, October 1997.

USAID. "FY 2000 Congressional Presentation -Haiti." U.S. Agency for International Development.

Weber, M. T., et al. "Informing Food Security Decisions in Africa: Empirical Analysis and Policy Dialogue." *American Journal of Agricultural Economics* 70, no. 5(1988): 1044-1052.

White, T. A., and G. R. Smucker. "Social Capital and Governance in Haiti: Traditions and Trends." The World Bank, August, 1998.

Wiens, T., and C. E. Sobrado. "Rural Poverty in Haiti." . The World Bank, August 1998.

Williamson, O., E. "The Logic of Economic Organization." *Journal of Law, Economics, and Organization* 4, no. 1(1988): 65-93.

World Bank (2000) Haiti at a Glance, 2000

World Bank. "Haiti -Sustainable Intensification of Agriculture." The World Bank, August 12 1998.

World Bank. "Haiti: The Challenges of Poverty Reduction." The World Bank, March 1998.