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P.O. BOX 93375
THE HAGUE
NETHERLANDS

MANANGA AGRICULTURAL
MANAGEMENT CENTRE
P.O. BOX 20
MHLUME
SWAZILAND

RICE SELF-SUFFICIENCY IN THE DOMINICAN REPUBLIC

This case was prepared by S. Huntington Hobbs, with the assistance of Luis B. Crouch and staff-members of the Instituto Superior de Agricultura in the Dominican Republic. The case is designed to serve as the basis for class discussion, rather than to illustrate either effective or ineffective management of an administrative situation of government policy. The case is not a comprehensive documentation of an actual situation, but a teaching document intended to promote the consideration of representative management and policy issues. The case is based on information drawn from a variety of sources, published and unpublished. Material herein is not to be quoted, cited, reproduced, or published in any form.

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INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH

Headquarters
Bezuidenhoutseweg 52
2594 AW, The Hague
Netherlands

Correspondence
P.O. Box 93375
2509 AJ, The Hague
Netherlands

Communications
Telephone 070 472491
Telex 33746
Cable ISNAR

INTRODUCTION

In the wake of Hurricane David, Daniel Marte, Director of the Rice Program of the Dominican Republic, met with 18 rice extension technicians in his office at the Juma Rice Research Center. The hurricane had battered the country badly, seriously damaging the rural infrastructure.

Daniel Marte spoke, trying to make himself heard above the drone of the air-conditioner and the machinery digging ditches outside his office. "As you well know, the primary goal of our country in 1980 remains self-sufficiency in rice. In addition to the new obstacles to increasing rice production caused by the hurricane, it has also exacerbated a number of existing problems, including distribution of improved seed from the Juma Research Center to the collective farms, the availability of tractors, transportation needs of extension workers, and the reluctance of Dominican farmers to adopt Juma's dwarf varieties."

The concern regarding the adoption of dwarf varieties was particularly troublesome in light of the popularity of "rattoon farming." Rattoon farming was the practice of leaving the rice crop stubble in the field after the harvest and letting the root system develop new tillers. This second crop was known as the rattoon crop. Dominican farmers had traditionally grown tall rice varieties that yielded a rattoon. Some farmers gathered two rattoons, i.e. three harvests from the same root system, each harvest yielding less than the previous one.

Rice researchers had developed dwarf varieties that yielded more than the traditional varieties. Two full cycles of an improved

variety could be harvested in place of the traditional variety which yielded one full cycle and one or two rattoons. The dwarf varieties had been released in the Dominican Republic in 1974 during the first year of the Agrarian Reform. The following year the dwarf varieties had been planted late due to drought and production was poor. This initial poor production performance raised doubts in the minds of many rice farmers about the dwarf varieties. Moreover, the high-yielding dwarf varieties did not generally yield a good rattoon.

Daniel Marte concluded his opening remarks to the rice production staff: "The months ahead are going to be extremely challenging. The pressure is greater than ever to increase domestic rice production to the point where imports are no longer necessary. With the skyrocketing costs of oil, we can ill afford to import rice, a product which we can produce here in the Dominican Republic. As you know, government at the highest levels is committed to self-sufficiency. This task falls squarely on our shoulders."

RICE IN THE DOMINICAN REPUBLIC

Rice was the principal food crop in the Dominican Republic. Dominicans derived from 21 to 27 percent of their daily calorie intake from rice (Exhibit 1). The average daily expenditure on rice was 9.8% of the daily budget. The average daily expenditure on rice of those having a per capita income between RD$600-RD$1,200* was 16.7% of the daily budget (Exhibit 2). Average per capita income

* Official exchange rate RD $1 = US $1.

was estimated to be US $450. The apparent per capita consumption of rice was 43.2 kilograms in 1978 (Exhibit 4).

The World Bank estimated in June, 1979, that the per capita food production of the Dominican Republic during 1976-1978 was 92% of the per capita food production of 1969-1971. The Dominican Republic had a population of approximately 5.3 million in 1979, growing at an annual growth rate of 2.9%.

RICE IMPORTS AND THE BALANCE OF PAYMENTS

After three years without rice imports, the Dominican Republic began to import rice in 1972; imports totalled over 36,000 metric tons from 1972 to 1978 (Exhibit 4). The cost of importing rice into the Dominican Republic reached a peak of $40.5 million in 1974 which was equivalent to 30.8% of the country's agricultural exports excluding sugar, and 6.2% of all exports that year (Exhibit 3).

Sugar traditionally accounted for nearly 30% of the country's exports. Three large companies accounted for all of the sugar production in the Dominican Republic. Sugar was grown of rain-fed land and was not considered to compete for land with rice. Over half of the agricultural land in the Dominican Republic, 54.6%, was dedicated to export crops in 1978 (Exhibit 5), and export crops accounted for 36.1% of the gross value of agricultural production (Exhibit 6). Rice accounted for 10.5% of the agricultural land (Exhibit 5) and 9.0% of the gross value of agricultural production (Exhibit 6). Between 1973 and 1978 rice production increased 28%, while production of export crops in 1978 was near or below 1973 levels (Exhibit 7).

A report to the Central Bank of the Dominican Republic indicated that Hurricane David had seriously affected 38% of the rice area, and that a minimum of $12 million in rice imports would be required in 1979 to offset decreased domestic production. The report indicated that the effects of Hurricane David would increase the balance of payments deficit for the Dominican Republic in 1979 from US $375 million to US $415 million (Exhibit 8).

JUMA RICE RESEARCH CENTER

The rice program was established in 1963 at the Juma Rice Research Center as part of an agreement of technical cooperation between the Governments of the Dominican Republic and Nationalist China. The Center was based on 75 hectares in the principal rice producing region of the Dominican Republic, and scientists worked in 7 sections: plant improvement, agronomy, disease surveillance, soil and fertilizer interaction, irrigation and drainage, seed production, and support to the agricultural extension service. Work was initially concentrated in improving native lines of rice, but subsequently a number of varieties were generated by crosses between the local materials and introductions from the International Rice Research Institute (IRRI). Some of the more common improved varieties were Juma 57 and Juma 58. The breeding program also sought to develop varieties somewhat taller than the semi-dwarfs, in order to improve competition with weeds.

The Juma Center contracted farmers to multiply seed, giving them a 10% premium over the price of first-quality commercial grain. Juma sold mainly Juma 57 and 58 certified seed. Juma produced rice seed principally for the collective rice farms of the Agrarian Reform.

INSTITUTE OF AGRARIAN REFORM

In 1972 the Congress of the Dominican Republic passed legislation which subjected to expropriation farms growing rice on land irrigated by government-built canals and exceeding 500 tareas (31.4 hectares). Former owners of appropriated land received the full market value or urban properties in exchange for their land. The Institute of Agrarian Reform (IAR) divided the appropriated land into collective farms and the use of the land was given to the landless poor. Choice irrigated rice lands became the prime target of the Agrarian Reform to insure the success of the land reform program. Few of the new settlers had experience growing rice, and as productivity on rice lands declined in 1974-1975, the National Rice Program focused its efforts on increasing rice yields on agrarian reform lands. Agrarian reform lands constituted approximately 50 percent of total national area planted to rice and accounted for 38.4 percent of national rice production in 1978. The IAR has used administrative and credit control over collective farms to effect the rapid adoption of high-yielding dwarf varieties Juma 57 and Juma 58. Collective farms are limited to growing rice.

The application of agrarian reform laws created uncertainty among medium and large scale farmers. Some farmers ceased investing in improvements to their rice lands, some changed crops, and some let the lands revert to pasture. In order to prevent these practices, the Congress of the Dominican Republic was debating a stricter law, the 'land-quota law'. The essential characteristics of the law were: 1) lands available for expropriation included lands where the IAR and the Ministry of Water Resources planned to build a canal;

2) once the plan to build a canal was made public, all transfer of title of property was void; 3) the crop in the ground at the time the plan was announced was to be the crop used to define the legal status of that land; 4) land holdings below 100 tareas (6.3 hectareas) was exempt; 5) land holdings above 100 tareas would have 50% of the land (above 100 tareas) expropriated, the IAR deciding what 50% it would keep in payment for the future construction of the canal; 6) payment of the land-quota was independent of the payment owners had to pay for water use.

The private rice sector lobbied against the land-quota law, and published full page ads in all newspapers in order that "public opinion be informed of its (the laws) incoherent and contradictory aspects, its unconstitutional nature, and its potential for a series of injustices which can significantly affect national production".

In 1977, an international development agency estimated that 32,500 families had received land through Agrarian Reform programs since 1962, and that 11,500 of these families had received the use of the land in the 1972-1976 period. The report stated that though the pace of land distribution had decreased sharply since 1976, 62% of the land expropriated in the 1972-1976 period was yet to be distributed. It was also estimated that of the 400,000 families in need of land, 100,000 were landless and 300,000 owned less than 2 hectareas.

INESPRE

The Institute for the Stabilization of Prices, (INESPRE), was created in 1973. All rice mills were required to sell all production at controlled prices to INESPRE. INESPRE also controlled the retail price of rice, was the monopoly seller to the wholesale and retail trade, and was the sole importer of rice (Exhibit 9). INESPRE attempted to stabilize the price of rice by releasing rice into the market throughout the year (Exhibits 10 & 11).

From 1971 to 1974 the international price of rice trippled from near $200 per ton in 1971 to over $600 per ton in early 1974 (Exhibit 12). In 1974 INESPRE imported a record 70.5 thousand metric tons of rice (Exhibit 4) at a record import price for the Dominican Republic of $571.72 per ton (CIF). During 1974, as an incentive to domestic production INESPRE increased the price it paid rice millers by 46% to 456.50 per ton (Exhibit 13). After 1974, however, the price INESPRE paid to rice millers remained fixed at $456.50 per ton, while INESPRE increased the retail price of rice from $0.42 per kilogram in 1974 to $0.64 per kilogram in 1977 (Exhibit 14). Though the price at which INESPRE bought domestic rice r remained fixed, and the price at which INESPRE sold rice to the retail trade had been allowed to rise, INESPRE estimated it only received 0.6% of the retail price of rice, while producers received 72.5%, rice mills 9.1%, and retailers 12.6% (Exhibit 15).

In 1975 the price of imported rice (CIF) declined to $389.29 per ton, below the $456.50 per ton INESPRE paid to the rice mills. Since 1975 INESPRE had relied on the earnings generated by selling

the lower-priced imported rice in the Dominican Republic to cover the losses caused by INESPRE's domestic operations. An INESPRE spokesman stated that, "The differential in prices obtained by the domestic sale of imported rice has permitted INESPRE, in good part, to subsidize our operations with national rice, permitting a decrease in our budgetary deficits, such as in our pr for stabilizing rice prices."

There were 790 wholesalers registered with INESPRE, each of which had a yearly rice quota. It was estimated that there were 11,000 retail outlets where rice could be purchased.

THE RICE PRODUCING INDUSTRY

In 1976 there were 131 rice mills in the Dominican Republic, a decrease from the 212 rice mills operating in 1969. Even with this reduced number of rice mills, the Ministry of Agriculture estimated the industry had a surplus capacity of 33% based on an 8-hour work day, 250 days of the year. The Institute of Agrarian Reform was purchasing some of the closed mills to process the rice grown on collective farms. The diminished profit margin left to the rice milling industry by the controlled prices decreed by INESPRE had forced the rice mills with too much excess capacity to close.

Processing plants traditionally assured a supply of unhusked rice by providing credit directly to small-scale producers, or indirectly through intermediaries who in turn provided credit and transportation to small-scale producers. The Ministry of Agriculture estimated that 30% of the credit received by producers came from processing plants. Repayment of the loan was usually in kind, and

effective interest rates varied from 2% to 10% per month. Large-scale producers sold directly to the processing plants, and generally secured the credit needed from banks. According to the Ministry of Agriculture, up to 60.8% of the credit received from processing plants was used to finance farm labor (Exhibit 16). Producers on Agrarian Reform farms were not allowed to receive credit from processing plants.

PRIVATE SEED INDUSTRY

Thirty percent of the rice seed used in the country was produced by Seed Producers of the Dominican Republic (PROSEDOCA) the only private seed company in the country. PROSEDOCA officials estimated that the Juma Research Station produced 40 percent of the seed and 30 percent of the seed used came from farmer stocks. PROSEDOCA sold certified seed for DR $0.51 per kilogram, while Juma sold its seed for DR $0.48 per kilogram. PROSEDOCA contracted farmers to multiply seed, giving them a 12% premium over the $0.24 per kilogram farm price of top quality commercial rice. PROSEDOCA sold Mongolo, Ingles Largo, ISA-21, Juma 57 and Juma 58. "Mingolo is the backbone of our business", said Juan Henderson, PROSEDOCA's General Manager. "The farmers won't live without it. It's drought resistant, and withstands salinity." Though he sold rattoon varieties, Juan Henderson did not buy seed that came from rattoon crops. "There is a saying that whoever plants seed from a rattoon crop is planting trouble," he remarked. To maintain quality control, Juan Henderson used the seed standards of the state of Texas in the USA as a rule of thumb. Henderson explained "The government should set the norms and there should be Government inspectors, but it doesn't happen. There is a law on the books calling for government inspection but it is useless.

There are no inspectors. That law was written in 1972; maybe by 1982 something will happen. We wish they would set and enforce standards. It would give us more prestige, more security."

Henderson wanted PROSEDOCA to export certified seed. PROSEDOCA's first large export shipment, 40 tons of ISA-21 bound for Jamaica, had been caught on the docks by Hurricane David, and the seed had to be sold domestically.

"We can process 3 to 4 tons of rice seed, in an hour." explained Henderson. "We can easily process twice the amount of seed we currently process. We are self-sufficient in seed. Seed is not a problem."

RICE PRODUCTION

The Ministry of Agriculture estimated that in 1971 there were 27,800 rice production units, and that farms of 80 tareas (5 hectareas) or less accounted for 74.4% of the rice production (Exhibit 17). Since 1974, 50% of the rice lands were collective farms administered by the Institute of Agrarian Reform. Collective farms accounted for 38.4% of the national rice production in 1978. The below-average productivity of collective farms was attributed by many to the inexperience in growing rice of the new collective farmers. While no official statistics were available, Dominican officials estimated that 50% of the total fields in the Dominican Republic were sown with improved varieties. It was estimated that 60% to 80% of the fields of the collective farms were sown with improved varieties. The principal improved varieties in the Dominican Republic were Juma 57, Juma 58, Tamioka, and ISA 21. The traditional variety, 'Ingles Largo' was used extensively as a winter rice (Exhibit 18).

The Food and Agriculture Organization (FAO) of the United Nations estimated that average rice yields for the Dominican Republic had increased from 2228 kilograms per hectare in 1963-65 to 3970 kilograms per hectare in 1975-77 (Exhibit 19). Rice research was initiated in 1963 in the Dominican Republic and the dwarf high-yielding varieties were released commercially in 1974.

Though rice yields were improving, average yields were still far below the potential demonstrated by rice yields on research stations. The International Center for Tropical Agriculture (CIAT) in Colombia was reporting yields up to 12,013 kilograms per hectare. The Agriculture Institute of Santiago (ISA) in the Dominican Republic released an imported variety as ISA-21 when on-station results showed yields of 10,350 kilograms per hectare (Exhibit 20). Though on-station yields would be difficult to duplicate on-farm, the Ministry of Agriculture considered that the adoption of dwarf high-yielding varieties by farmers would increase farm yields from 40% to 60%.

A survey conducted in 1975 by economists of the Ministry of Agriculture indicated that farmer rice yields in the northeast of the country varied from 2,400 kilograms to 6,800 kilograms per hectare. The survey indicated that collective farmers with previous experience in rice who had sown high-yielding dwarf varieties had a yield of 5,434 kilograms per hectare while private farmers sowing traditional varieties had a yield of 4,090 kilograms per hectare. The costs of production for collective farmers were found to be $736.64 per hectare, while the costs of production for private farmers were 643.52. Most farmers were found to have used rice

nurseries. Collective farmers planting dwarf varieties by direct seeding were found to have costs of production of $724.32 and an average yield of 4,762 kilograms per hectare (Exhibit 21). The direct water seeding method was developed primarily to assist in the control of grass and weeds.

A report by visiting rice experts in 1978 noted a problem of high salinity in the northern rice area of the Dominican Republic. The report also stated that "deficiencies in land preparation and levelling were noticed in commercial rice fields. A red rice infestation was another problem observed in commercial fields. These problems were apparently accentuated as a result of a change from tall rice varieties to semi-dwarf types." Nevertheless, the report concluded that "despite these factors, excellent rice crops were observed with high-yielding varieties recommended by the national rice program indicating that problems will be diminished and yields should increase in the near future."

A study indicated that 95% of the rice area in the Dominican Republic was irrigated in 1978 (Exhibit 22). A 1976 survey of water resources in the Dominican Republic found a network of 108 independent river systems, and an irrigated area of 154,000 hectares of which 121,000 hectares were serviced by State-owned irrigation facilities. Nearly 50% of the rice area was irrigated by State-owned canals. The survey found that canals were frequently blocked due to inadequate maintenance. The blockage problem resulted in over-irrigation of upstream areas, and under-irrigation of downstream areas. Thus, in times of inadequate rainfall, downstream areas on blocked canals could face drought conditions. Rice was first

cultivated in the Dominican Republic in the 1910's when the first irrigation canals were constructed.

The first rice crop was generally planted in January-February, with the second crop planted in June-July if a rattoon was not harvested.

RATTOON RICE PRODUCTION

The full extent of rattoon farming in the Dominican Republic was unknown. Many farmers continued to plant traditional varieties which could yield a rattoon crop that was 50% or more of the first harvest. Some farmers had adopted high-yielding varieties such as ISA-21 that yielded a good rattoon crop. Many Government officials considered rattoon farming the single greatest impediment in the Dominican Republic to increasing domestic rice production. A rice researcher at Juma explained the disadvantages of rattoon farming; "A full cycle of Juma 57 or 58 should yield 5 tons per hectare under farmer conditions. That's 10 tons a year. A traditional variety will yield 3-4 tons per cycle. That would be 6-8 tons a year. But that's not what they do. They harvest 3-4 tons per hectare on the first cycle and then leave the stubble in the field and harvest only half as much during the next cycle, maybe 2 tons per hectare. That is a lot of lost production."

During 1978 the International Center for Tropical Agriculture (CIAT) in Colombia conducted research on first harvest and rattoon yields. The research indicated in part that "yields in the first harvest are not a good indication of the production from rattooning." Indeed, one variety, CICA 8, had the highest yield in the first

harvest, 6,046 kilograms per hectare, and the lowest yield in the rattoon harvest, 119 kilograms per hectare (Exhibit 23). The highest combined yield, 7,109 kilograms per hectare, was achieved by the variety with the highest rattoon yield, 1,566 kilograms per hectare. This high regrowth variety, Juma 57, had been imported from the Dominican Republic where the variety was not considered to have a high rattooning capacity. Traditional rattooning varieties from the Dominican Republic were not included in the test. CICA-4, the variety that yielded the highest rattoon as a percent of the first harvest, 33.52%, had been released in the Dominican Republic as Avance-72.

SMALL-SCALE PRODUCER

Belarmino Vasquez knew his land well. For 36 years, he had worked it as a hired laborer. He had cleared the land in 1937, working at $0.10 per day for a landed family. Then, in 1973, with the uncertainty created for large landowners by the Agrarian Reform, Vazquez was able to purchase 87 tareas (5.5 hectares) on credit from the former owner. During 40 years of farming the same land, Vazquez had developed a farming schedule he adhered to strictly: first planting, February 25; first harvest, June 10-15; second harvest, September 20-24; third harvest, December 10-14. Belarminio Vazquez was a rattoon farmer.

"There are two essential operations to a good rice crop," said Vazquez. "a good level preparation of the fields to permit uniform irrigation, and a careful transplant. After the first harvest in June, I neglect the rice fields, let the little rattoon

grow, and go take care of other business." Vazquez had some small rain-fed plots where he grew "beans, bananas, and other things I like to eat." He always planted the traditional Mingolo rice variety, which produced a good rattoon. By allowing the rattoons to grow, Vazquez avoided the work and expense of planting a new crop cycle. But the principal reason Vazquez allowed the rattoons to grow was that he harvested more from two consecutive rattoons than from one crop cycle. "I get 450 sacks from the two rattoons," said Vazquez. "I never get more than 390 sacks from a single crop cycle." (Exhibit 24).

Vazquez also preferred Mingolo because the tallness of Mingolo blocked sunlight from potential weeds, and with an application of pre-emergent herbicide in February, weeds were effectively controlled Vazquez commented that after 40 years of planting the traditional tall varieties, the field was so infested with the traditional tall varieties that planting a new dwarf variety would yield a mixture of different heights and growing cycles that would be very difficult to work with. "I know this Mingolo very well," said Vazquez, "it has always treated me well. It is tempting fate to change."

Vazquez was pleased with his experience with bank credit. The State Agricultural Bank had given him enough money to plant his crop. "Bank money is delicate money," said Belarminio Vazquez, "You have to work and produce to keep something after you pay back. It would be easy to drink it all. The banks do not take credit away the user takes his own credit away."

Vazquez stood by the edge of his field. The tall stalks were beginning to bend under the weight of the second rattoon. Vazquez spoke, "We know what has to be done, we know that productivity can increase. I would like to dump $300 of fertilizer on this field right now. We know what is technically correct for rice, but we cannot afford those practices. There are agronomists in the world, they know what to do. They come and go. There are great institutions that study rice. They have the funds, I don't. I have seen the dwarf varieties in this zone. They give good results, but they are too much investment for me."

LARGE SCALE PRODUCER

Jose Perrin considered himself the best rice farmer in the Dominican Republic. To prove it, Jose Perrin challenged Juma Rice Research Center. Perrin gave the Center the choice of any 50 tareas (3.2 hectareas) of his land, and he took an adjoining 50 tareas. "It was a test of practice versus theory," he remarked. In the first year, Perrin claimed he got produced 100 kilos more per tarea than did the Research Center. Perrin commented, "Juma claimed I had better land. So they chose another plot, and I still out produced them by the same amount." Jose Perrin explained how he did it: "The Research Center recommended fertilizing before using herbicides. This is nonsense. Since an herbicide retards growth, fertilization should be after the herbicide. The Research Center recommended 15 cc. of herbicide per gallon of water. We used a rum bottle cap to measure the herbicide. The first bottle cap was too big so we drank the rum and bought a smaller bottle whose cap was

just right. As to insecticide, the Research Center used a half-liter of insecticide mixed in a 50 gallon drum. This is too much. A 50 gallon drum needs only enough insecticide to fill a sardine can. And not only that, Juma weeded and I did not."

Jose Perrin received visitors on his patio. Leaning back in his chair, his gun stuck in his waistband, he told his favorite story: "A friend of mine was walking through Rosario, Peru, when he saw an excellent rice field. He pulled out one spike, stuck it in his pocket, and one day he gave it to me. I planted the spike and got ½ kilo. I planted that and got 15 kilos, which I had to water in the drought of '75. I now have 18,000 kilos. It yields 700 to 800 kilos per tarea. It yields more than Juma 58. 'What's its name?' I asked my friend. 'Call it whatever you want, give it your name,' he said. So I called it JP. The Ministry of Agriculture has not wanted to recognize JP as a variety. JP is propagating, so they will have to recognize it sooner or later."

Jose Perrin grew two crop cycles a year and did not rattoon. His farm was fully mechanized. He grew only JP on his 2,626 tareas (165 acres) and many farmers came to his farm to buy JP. JP received a premium price from millers. Perrin concluded, "In this country we have some of the best rice lands in the world. We can produce what we need."

THE RICE PROGRAM MEETING

Following Daniel Marte's opening remarks and the technicians' production reports, discussion touched on a number of issues.

The extension technicians were concerned about the damage done by the hurricane to the infrastructure in their zones: bridges were still unrepaired, irrigation canals blocked, roads washed out. "We must open the roads to maintain the confidence of the farmers of the Agrarian Reform," said one technician. "The Communal farmers trust the Rice Program, and they are counting on us."

Another technician voiced concern about the availability and costs of machinery and supplies. He added that due to maintenance problems the tractors on collective farms in many cases were capable of working only a few hours a week. Daniel Marte responded that the Rice Program would rent tractors where necessary, and he told the technicians that the IAR had finally agreed to rent tractors from the private sectors; the IAR could provide the fuel to decrease the costs of production to collective farmers and to prevent speculation by private equipment dealers.

Several technicians also expressed concern that the Ministry of Agriculture be apprised of the need to secure more cooperation from the Ministry of Water Resources in the repair of canals. One technician commented that the way to secure the cooperation of the Ministry of Water Resources was by building a personal relationship with the water technicians in their area.

The head of Rice Training discussed another problem. The Department of Extension and Training of the Ministry of Agriculture was about to expand a pilot project of on farm visits and training. "This will do for beans, bananas and maize," said the Head of Rice Training, "but not for a highly technical crop like rice." Here in Juma we have the physical and human capabilities to teach full-fledged classes, and we have a fully developed program of field days for farmers to visit the Center. We must remain an integral center with rice production managed exclusively on a national basis."

Finally, the subject of rattoon farming was raised. When the production reports had been presented earlier, it had become clear that rattoon cropping was on the increase. During 1977 and 1978, after an expensive program of demonstration plots and increased technical support, many farmers were still reluctant to adopt the dwarf varieties Juma 57 and Juma 58. Some farmers were adopting an improved tall variety, ISA-21, that yielded a rattoon. Daniel Marte stated that the Minister of the Institute of Agrarian Reform was in agreement with the Rice Program that the rattoon was to be eliminated on collective farms.

One of the technicians expressed the feelings of the entire group that was assembled in Marte's office: "I found 10,000 tareas of rattoon on a collective farm. We will not permit the rattoon. We will pay for the tractors and we will pay the gasoline and we will plow under the ISA 21. We will block the credit of those planting rattoon varieties, and rattoon varieties will not be accepted for processing. We are meeting farmer resistance. They don't want to

put in a second crop. But the land is there, and there are plenty of idle people. If we are to meet the need for increased domestic rice production, we will not permit the rattoon on collective farms."

EXHIBIT 1

PERCENT DAILY CALORIC INTAKE DERIVED FROM PRINCIPAL FOOD STUFFS

IN THE DOMINICAN REPUBLIC, 1977

ANNUAL FAMILY INCOME	RICE	CASSAVA	BEANS	BANANA	MEAT	OTHERS	TOTAL
$0 - 600	27	8	4	22	3	36	100
$601 - 1200	27	4	4	19	4	42	100
$1201 - 3600	25	2	2	17	7	47	100
$3600 or more	21	1	2	14	9	53	100

Source: Ministry of Agriculture, Dominican Republic

EXHIBIT 2

PERCENT OF DAILY BUDGET SPENT ON RICE IN THE DOMINICAN REPUBLIC, 1977

ANNUAL FAMILY INCOME	PERCENT OF BUDGET SPENT ON RICE	PERCENT OF BUDGET SPENT ON FOOD
600-1200	16.7	50.3
1201-2400	13.2	46.5
2401-3600	11.2	43.4
3601-4800	9.0	39.5
4801-7200	5.8	35.3
Weighted average	9.8	N.A.

Source: Central Bank, Dominican Republic.

EXHIBIT 3

RICE IMPORTS vs AGRICULTURAL EXPORTS and ALL EXPORTS

YEAR	AGRICULTURAL EXPORTS EXCLUDING SUGAR millions of dollars	ALL EXPORTS INCLUDING SUGAR millions of dollars	RICE IMPORTS (CIF) millions of dollars	AGRICULTURAL EXPORTS (EXCLUDING SUGAR)	RICE IMPORTS AS A PERCENT OF ALL IMPORTS
1970	65.6	211.2	--	--	--
1971	62.1	240.7	--	--	--
1972	78.0	248.0	2.2	2.8	0.1
1973	99.2	480.9	14.6	14.7	3.2
1974	131.5	650.8	40.3	30.6	6.2
1975	105.8	920.5	19.3	18.2	2.1
1976	189.2	714.7			
1977	N.A.	780.0			

Source: Ministry of Agriculture.

EXHIBIT 4

RICE PRODUCTION IN THE DOMINICAN REPUBLIC (IN METRIC UNITS)*

YEAR	AREA (THOUSANDS OF HECTARES)	PRODUCTION (THOUSANDS OF METRIC TONS)	IMPORTS (THOUSANDS OF METRIC TONS)	APPARENT CONSUMPTION	POPULATION (THOUSANDS)	APPARENT CONSUMPTION PER CAPITA (KILOS/YEAR)
1962	79.5	75.2	0.02	75.2	3367.0	22.3
1963	73.5	73.8	32.4	106.6	3475.0	30.5
1964	79.5	92.5	22.0	114.5	3587.0	31.8
1965	74.5	108.4	0.08	108.5	3703.0	29.1
1966	76.5	106.3	-	106.3	3823.0	27.7
1967	74.5	113.8	0.02	113.8	3881.0	29.1
1968	72.5	116.1	17.6	133.7	3941.0	34.1
1969	75.5	125.9	-	126.3	4001.0	31.4
1970	82.5	174.0	-	174.0	4061.9	42.7
1971	75.0	152.7	-	152.7	4181.9	36.4
1972	80.0	162.9	8.9	171.8	4304.9	40.0
1973	87.4	178.0	29.8	207.8	4431.7	46.8
1974	135.9**	194.4	70.5	264.8	4562.3	58.2
1975	131.1	198.9	49.6	248.5	4096.8	51.7
1976	96.4	191.7	32.0	223.7	4835.2	46.4
1977	N.A.	201.6	62.2	249.9	4977.7	50.0
1978	N.A.	228.7	10.5	221.5	5124.4	43.2

Source: INESPRE and Ministry of Agriculture

* For local units see Exhibit 4A.

RICE PRODUCTION IN THE DOMINICAN REPUBLIC (IN LOCAL UNITS)

YEAR	AREA Thousands of Tareas[1]	PRODUCTION Thousands of Quintales[2]	IMPORTS Thousands of Quintales	APPARENT CONSUMPTION Thousands of Quintales	POPULATION Thousands	APPARENT CONSUMPTION PER CAPITA lb/yr
1962	1072.0	1853.6	0.4	1854.0	3367.0	49
1963	1253.0	1683.0	717.7	2344.6	3475.0	67
1964	1272.0	2035.2	484.8	2519.0	3587.0	70
1965	1192.5	2385.2	1.8	2386.8	3703.0	64
1966	1224.3	2338.6	--	2338.6	3823.0	61
1967	1192.5	2504.2	0.4	2504.6	3881.0	64
1968	1160.7	2553.5	386.9	2940.4	3941.0	75
1969	1208.4	2770.3	--	2779.3	4001.0	69
1970	1319.7	3827.1	--	3827.1	4061.9	94
1971	1200.0	3360.0	--	3360.0	4181.6	80
1972	1280.0	3584.0	195.1	3379.1	4304.9	85
1973	1398.0	3916.0	654.5	4570.5	4431.7	103
1974	2174.0*	4276.0	1549.9	5825.9	4562.3	128
1975	2096.0	4376.0	1091.5	5467.5	4696.8	116
1976	1543.0	4218.0	703.7	4921.7	4835.2	102
1977	--	4435.0	1369.0	5498.5	4977.7	110
1978	--	5031.0	230.9	4873.2	5124.4	95

1 1 Tarea = 1/16 Hectare
2 1 Quintal = 100 pounds

*Official rice area statistics considered questionable afetr 1974 by some International Agencies.

EXHIBIT 5

AREA BY CROP IN THE DOMINICAN REPUBLIC

Domestic consumption Crops	Area (thousands of hectares)	Percent
Rice	102.23	10.3
Maize	47.54	4.9
Beans	43.20	4.5
Banana	49.68	5.1
Cassava	24.46	2.5
Potato	1.69	0.2
Yam	3.14	0.3
Sweet Potato	7.86	0.8
Yautia	6.16	0.6
Peanuts	49.05	5.1
Coconut	13.83	1.4
Sorghum	4.40	0.4
Vegetables	5.72	0.6
Fruits	25.28	2.6
Guandul	9.18	0.9
Frying Banana	25.00	2.8
Industrial Tomato	5.06	0.5
Red Pepper	0.80	0.1
Onion	0.70	0.1
Bija	0.50	0.1
Ginger	2.30	0.2
Cotton	1.10	0.1
Others	11.22	1.1
Subtotal	440.00	45.4
Export Crops		
Tobacco	35.35	3.6
Cocoa	94.34	9.7
Coffee	155.31	16.0
Sugar	245.00	35.3
Subtotal	530.00	54.6
TOTAL	970.00	100.0

Source: Ministry of Agriculture.

Exhibit 6

Dominican Republic

Value of Principal Agricultural Products (1975 - 1978)

Production Areas	in thousands of RDA, farm-gate prices 1975	1976	1977	1978	Current farm-gate prices	Current prices to the consumer and exporter (thousands of RD$)	%
Production of Internal Consumption							
Rice	37.789	32.512	37.655	42.713	59.063.94	125.775	9.0
Beans	8.136	7.285	12.147	9.560	16.912.64	30.952	
Maize	5.997	11.812	8.705	6.789	7.680.12	14.718	
Peas	3.474	3.574	3.809	4.077	6.333.47	11.390	
Sweet Potato	7.313	7.979	6.337	6.463	7.832.40	12.051	
Name (tropical tuber)	3.439	3.504	3.542	2.834	3.733.60	7.800	
Potato	1.798	2.274	1.251	1.200	2.942.65	5.397	
Yautia (tropical tuber)	4.875	5.392	6.066	5.493	7.400.20	15.485	
Cassava	16.822	13.715	25.572	16.425	17.832.40	39.264	
Auyama (tropical tuber)	1.390	1.423	1.962	1.274	2.328.00	4.462	
Onion	1.430	1.672	1.104	2.508	2.571.36	11.700	
Tomato	1.202	1.244	943	1.150	2.328.00	9.612	
Plantain	28.085	34.030	26.527	35.588	43.400.00	60.760	
Peanut	2.533	1.938	1.837	1.976	9.045.00	24.100	
Crop Subtotal					199.403.78		
Milk	17.220	18.130	18.760	19.530	41.850.00	94.860	
Beef	47.647	51.251	52.576	54.696	53.520.00	93.912	
Pork	11.322	12.190	12.788	16.100	15.290.00*	34.650	
Poultry	25.038	26.381	23.002	27.869	37.758.00*	46.748	
Livestock Subtotal					148.418.00		
SUBTOTAL	226.018	243.286	243.691	256.255	347.821.78	891.719	63.9
Products for Export							
Coffee	36.390	14.370	26.340	24.510	47.590.25	128.200	9.2
Cocoa	51.030	50.820	51.870	41.790	67.992.33	85.100	6.1
Tabacco	13.825	26.600	27.300	43.260	27.445.88	51.057	3.7
Sugar	110.356	121.825	124.018	113.758	115.330.00	239.985	17.2
SUBTOTAL	211.601	213.615	229.528	223.318	258.358.51	504.342	36.1
TOTAL	437.619	456.801	473.219	479.573	606.180.29	1.396.061	100.0

Source: Ministry of Agriculture

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EXHIBIT 7

PRODUCTION OF PRINCIPAL FOODSTUFFS
DOMINICAN REPUBLIC 1973-1978
(Thousands of metric tons)

							INDICES					
	1973	1974	1975	1976	1977	1978	1973	1974	1975	1976	1977	1978
DOMESTIC CONSUMPTION												
Rice	178.0	194.4	198.9	191.7	201.6	208.7	100	111	114	119	113	128
Beans	29.1	40.1	22.6	20.2	32.4	26.5	100	138	78	70	116	91
Maize	51.9	59.0	43.7	86.0	63.4	60.8	100	114	84	166	122	95
Sweet potatoes	83.4	75.3	68.8	75.1	59.6	60.9	100	90	83	90	72	73
Cassava	174.9	115.0	152.3	124.2	231.4	148.7	100	66	87	71	132	85
Potato	21.5	21.5	17.5	22.1	12.3	11.7	100	100	82	103	57	54
Banana (million)	39.0	38.8	31.1	37.7	28.0	39.5	100	99	79	95	75	101
Yam	27.3	28.0	28.7	29.2	29.5	23.6	100	103	105	107	108	87
Yautia	37.7	41.3	32.9	36.4	40.9	37.0	100	103	82	91	102	93
Guandul	13.1	13.4	14.1	14.5	14.1	16.6	100	102	108	111	108	127
Auyama	9.3	9.0	9.5	9.8	7.4	8.8	100	97	103	105	79	95
Onion	6.9	11.1	7.8	9.1	6.0	13.6	100	161	113	132	87	197
Tomato	17.7	18.2	16.9	16.6	13.3	16.2	100	103	95	99	75	91
Peanuts	20.0	18.0	14.0	10.6	10.2	11.0	100	90	70	53	51	55
Milk (million liters)	11.5	12.5	11.2	11.8	12.2	12.7	100	104	93	98	102	106
Meats:												
Beef	44.7	45.3	40.9	44.0	40.5	46.9	100	101	91	98	90	105
Pork	11.1	11.4	11.7	12.0	2.6	15.9	100	103	105	109	114	143
Chicken	29.5	29.1	36.7	36.7	33.7	40.9	100	112	142	149	130	156

EXHIBIT 7

(continued)

							INDICES					
	1973	1974	1975	1976	1977	1978	1973	1974	1975	1976	1977	1978
EXPORT PRODUCTS												
Sugar	1,142.7	1,233.4	1,132.3	1,250.0	1,777.6	1,165.0	100	108	99	109	103	102
Coffee	46.4	42.0	55.1	21.8	39.9	37.1	100	91	119	47	86	80
Cocoa	30.9	40.7	33.1	33.0	33.7	27.1	100	132	107	107	109	88
Tobacco	39.6	30.6	18.0	34.5	35.5	42.3	100	77	45	87	89	107

Source: Ministry of Agriculture.

Exhibit 8

DOMINICAN REPUBLIC

BALANCE OF PAYMENTS

(in millions of US$)

	Projections for 1979 before the hurricanes	Revised Projections for 1979
Exports	856	803
Sugar	234	237
Coffee	150	127
Cocoa	89	76
Tabacco	44	44
Iron Ore	120	120
Gold	115	115
Bauxite	22	22
Other Exports	82	62
Imports	- 1.021	-1.080
Petroleum	307	307
Commercial Balance	-165	-227
Service Balance	-278	-228
Net Transfer	60	90
Net Current Account	-383	-415

Source: Central Bank

APPENDIX 9

Flow of Rice

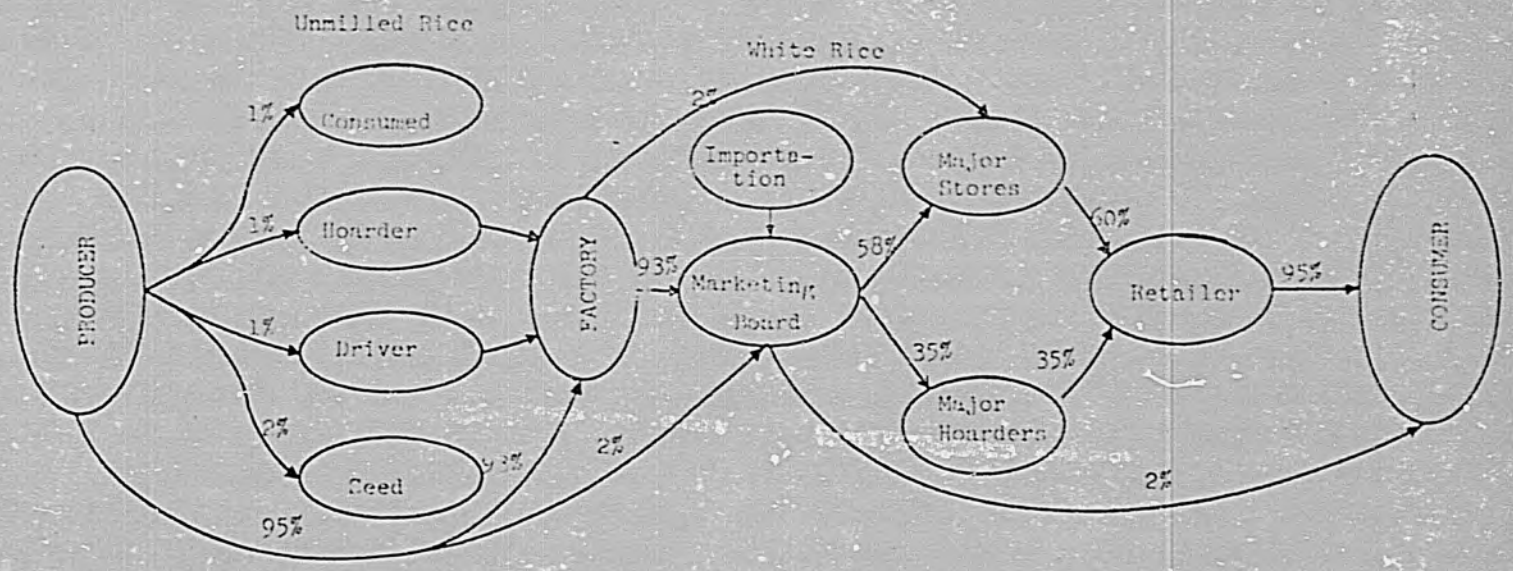


EXHIBIT 10

MONTHLY DISTRIBUTION OF INESPRE[1] DOMESTIC RICE PURCHASES AND SALES, 1975

MONTHS	PURCHASES (IN PERCENT)	SALES (IN PERCENT)	NET ACCUMULATION
January	12.9	6.2	+6.7
February	9.5	6.4	+3.1
March	4.7	8.1	-3.4
April	1.0	8.7	-7.7
May	0.3	7.5	-7.2
June	3.7	7.8	-4.1
July	11.0	9.8	+1.2
August	13.0	8.4	+4.6
September	12.7	10.8	+1.9
October	8.6	9.5	- .9
November	8.3	7.9	+ .4
December	14.3	8.9	+5.4

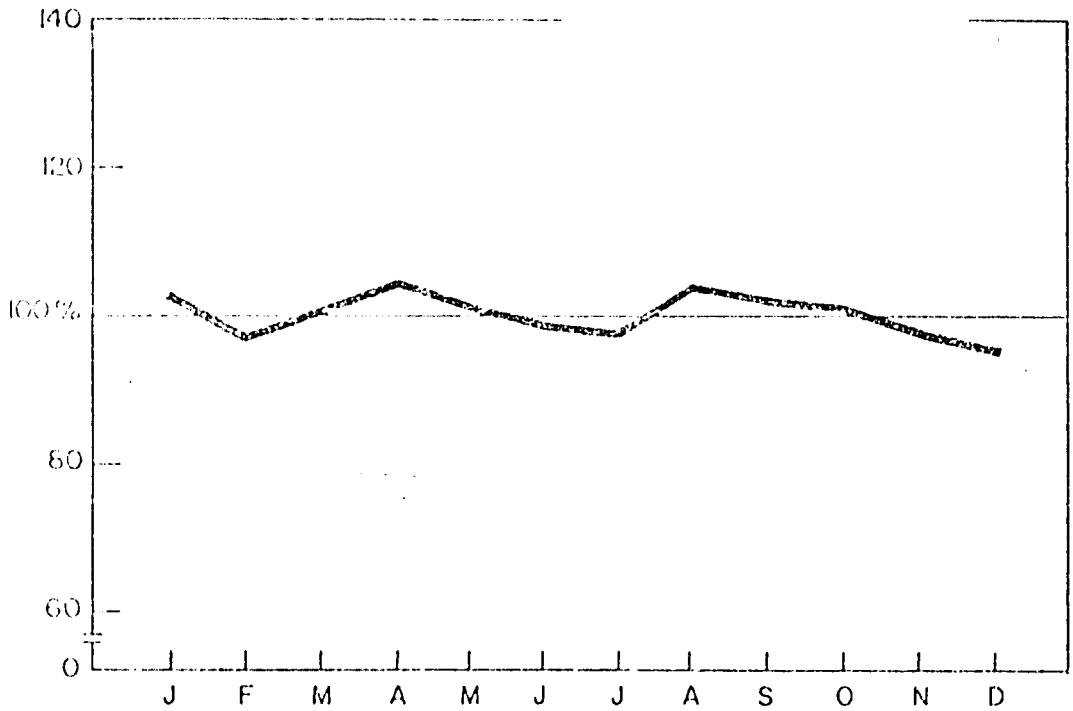
[1] Institute for Price Stabilization

Source: INESPRE, 1976.

EXHIBIT II

SEASONAL VARIATION OF CONSUMER RICE PRICES

(Ave 1968-76)



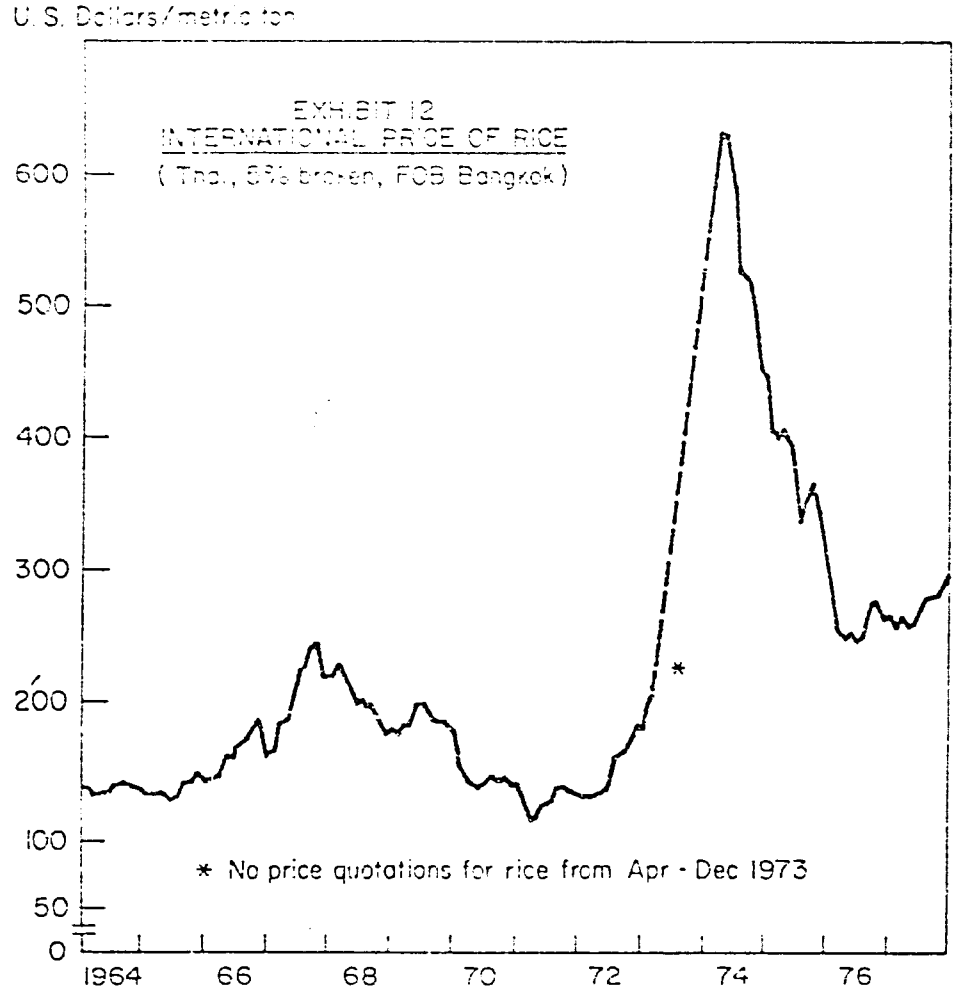

U. S. Dollars/metric ton
EXHIBIT 12
INTERNATIONAL PRICE OF RICE
(Thai., 5% broken, FOB Bangkok)
600
500
400
300
200
100
50
0
1964
66
68
70
72
74
76
*
* No price quotations for rice from Apr - Dec 1973

EXHIBIT 13

PRICE OF IMPORTED & DOMESTIC RICE FOR INESPRE

AND AVERAGE ANNUAL CONSUMER PRICE

1972 - 1977

YEAR	INESPRE IMPORT PRICE CIF $/ton	INESPRE PURCHASE PRICE FROM RICE MILL* $/TON	DOMESTIC RETAIL PRICE OF RICE $/ton (ann. avg.)	RATIO OF IMPORTED RICE PRICE vs DOMESTIC RICE PRICE TO INESPRE
1972	$243.60	N.A.	$330	N.A.
1973	488.21	312.67	420	1.56
1974	571.72	456.50	510	1.25
1975	389.29	456.50	590	0.85
1976		456.50	570	
1977		456.50	620	

* Estimated by the Ministry of Agriculture as INESPRE prices were not registered in Government statistics.

EXHIBIT 14

RETAIL RICE PRICE IN THE DOMINICAN REPUBLIC

($RD per kilogram of clear rice)

MONTHS	1972	1973	1974	1975	1976	1977
January	.33	.35	.42	.55	.64	.62
February	.33	.42	.42	.55	.62	.62
March	.33	.42	.42	.55	.59	.62
April	.35	.42	.42	.55	.57	.62
May	.33	.42	.44	.59	.57	.62
June	.33	.51	.51	.62	.57	.64
July	.35	.42	.53	.59	.59	.64
August	.35	.42	.55	.59	.59	
September	.35	.42	.55	.57	.64	
October	.35	.44	.55	.57	.64	
November	.35	.44	.55	.57	.64	
December	.33	.42	.55	.62	.66	

Source: INESPRE, 1977.

EXHIBIT 15

MARKETING MARGINS FOR PRODUCTION, PROCESSING AND DISTRIBUTION OF RICE

Margin to Producer	72.5 %
Margin to Trucker	1.7
Margin to Processing Plant	9.1
Margin to INESPRE	0.6
Margin to Wholesaler	3.5
Margin to Retailer	12.6
TOTAL	100.0 %

EXHIBIT 16

RELATIVE USE OF CREDIT FROM DOMINICAN RICE PROCESSING PLANTS BY FARM SIZE, 1977

(IN %.S)

USE	SIZE OF FARM UNIT (IN HECTARES) LESS THAN 3	3 TO 6	6 TO 31	31 TO 125
Rent or purchase of machinery	39.2	11.7	9.7	20.8
Fertilizer	18.2	13.0	31.3	10.4
Labor	21.3	60.8	42.0	41.7
Seed	4.8	4.7	7.3	2.1
Family expenditures	3.1	8.3	9.7	4.2
Other	13.4	1.5	-	20.8
TOTAL	100.0	100.0	100.0	100.0

Source: Ministry of Agriculture

EXHIBIT 17

RICE PRODUCTION (IN PERCENT) BY FARM SIZE IN THE DOMINICAN REPUBLIC, 1977

AREA (IN TAREAS[1])	PERCENT OF PRODUCTION	CUMULATIVE % OF PRODUCTION	PERCENTAGE SOLD COMMERCIALLY	PERCENT CONSUMED BY PRODUCER
Less than -5	0.7	0.7	46.2	53.8
5.1 - 30	10.2	10.9	81.3	18.7
30.1 - 80	63.5	74.4	96.0	4.0
80.1 - 200	19.4	93.8	95.5	4.5
200.1 - more than	6.2	100.0	96.7	3.3

1 tarea = 1/16 hectare.

Source: Ministry of Agriculture, Dominican Republic.

EXHIBIT 16

PRINCIPAL RICE VARIETIES IN THE DOMINICAN REPUBLIC

VARIETY	ORIGIN	HEIGHT (CENTIMETERS)	LENGTH OF GROWING CYCLE (DAYS)	RATTOON[1]	PHOTO-SENSITIVITY	SALINE TOLERANCE
Mingolo	Traditional	150-170	140-150	Good	No	Yes
Ingles Largoo	Traditional	140-160	140-155	-	Yes	Yes
Juma-57	Juma Rice Research Center	80- 90	155-165	-	No	No
Juma-58	Juma Rice Research Center	85- 95	155-165	-	No	No
Tenioka	Unknwon	102	145-150	-	No	No
ISA-21	Instituto Superior de Agricultura[2]	100-110	140-145	Good	No	No
Tono Brea	Traditional	150-170	130-140	Good	Yes	Yes
Juma-60	Juma Rice Research Center	86	145-150	-	No	No
Cica-4*	International Center for Tropical Agriculture (CIAT)	85	120-130	Good	Yes	Yes
IR 5	International Rice Research Institute (IRRI)	90-100	130-140	-	No	Yes
IR 6	International Rice Research Institute	90-100	130-140	-	No	No

1 Any variety left in the field can yield a rattoon, but some varieties yield a better rattoon. Varieties marked as having a "good" rattoon can yield a rattoon equivalent to 50% of the first harvest.

2 The Instituto Superior de Agricultura (ISA) adapted ISA-21 from material from the International Center for Tropical Agriculture (CIAT) in Columbia.

* Also known in the Dominican Republic as Avance-72

EXHIBIT 19

Average of rice yields for selected countries in Latin America. Averages 1963/65, 1973/75 and 1975/77

Country	1963/65	1973/75	1975/77
		kg/ha	
Colombia	1964	4229	4169
Peru	3965	4152	4425
Dominican Rep.	2238	3444	3970
Venezuela	1841	2774	3246
Ecuador	1501	2698	2787
Coasta Rica	1374	1182	2065
Nicaragua	1314	2976	2954

Source: Estimated from FAO

EXHIBIT 20

RICE YIELDS ON RESEARCH STATIONS

International Center for Tropical Agriculture (CIAT)
Cali, Colombia

VARIETY	YIELD (kg/ha)
Bg 90-2	12,015
2135	10,093
2123	10,041
CICA 8	9,252

Source: CIAT Annual Report 1978

Agricultural Institute of Santiago (ISA)
Santiago de los Caballeros, Dominican Republic

VARIETY	YIELD (kg/ha)
ISA-21*	10,350
ISA-22*	9,040
IR-6**	9,060
Mingolo***	7,810

Source: ISA

* Supplied by the International Center for Tropical Agriculture, Colombia

** Supplied by the International Rice Research Center, Philippines.

*** Traditional Dominican variety

COSTS OF RICE PRODUCTION IN THE NORTHEAST OF THE DOMINICAN REPUBLIC
BY TYPE OF LAND TENURE AND VARIETY PLANTED
August - December 1975

ACTIVITY	PRIVATE FARMERS TRADITIONAL VARIETIES		COLLECTIVE FARMERS DWARF VARIETIES		COLLECTIVE FARMERS DWARF VARIETIES DIRECT SEEDING	
	RD$ per hectare	Percent	RD$ per hectare	Percent	RD$ per hectare	Percent
TOTAL	$643.52	100.0%	$736.64	100.0%	$724.32	100.0%
PREPARATION OF NURSERY	50.72	7.9%	44.16	6.0%	--	
Seed	42.24		42.24		54.8	7.5%
Cutting	3.20		--		--	
Bund Repair	2.24		--		--	
Planting	0.32		0.16		--	
Fertilizer	1.92		1.76		--	
Insecticide	0.48		--		--	
Application	0.32		--		--	
LAND PREPARATION	168.00	26.1	168.00	22.8	168.00	23.2
Cutting	112.0		112.00		112.00	
Bund Repair and Field Levelling	56.0		56.0		56.0	
TRANSPLANT	48.0	7.5	64.00	8.7	--	
AGRICULTURAL INPUTS	195.84	30.4	248.64	33.7	269.12	37.2
Herbicide	55.36		41.76		62.56	
Fertilizer (15-15-15)	89.60		154.40		154.40	
Ammonium Sulphate	26.40		25.12		25.28	
Insecticide	20.16		23.84		23.84	
Pesticide (for rats)	4.32		3.52		3.04	

(continued)

EXHIBIT 21
(continued)

ACTIVITY	PRIVATE FARMERS TRADITIONAL VARIETIES		COLLECTIVE FARMERS DWARF VARIETIES		COLLECTIVE FARMERS DWARF VARIETIES DIRECT SEEDING	
	RD$ per hectare	Percent	RD$ per hectare	Percent	RD$ per hectare	Percent
LABOR	$95.36	14.8%	$96.96	13.2%	$132.16	18.2%
Irrigation	4.96		4.96		4.96	
Canal Maintenance	16.00		32.00		96.00	
Weeding	48.00		32.00		--	
Application of						
Herbicide	8.00		3.20		6.40	
Fertilizer	14.40		19.20		19.20	
Insecticide	4.00		5.60		5.60	
HARVEST	72.00	11.2	96.00	13.0	84.00	11.6
CROP TRANSPORT	9.60	1.5	16.00	2.2	14.08	1.9
WATER TAX	4.00	0.6	2.88	0.4	2.88	0.4
YIELD (kilos per hectare)	4,090		5,434		4,762	

Source: Ministry of Agriculture, Department of Economics

EXHIBIT 22

Area sown in the two-rice sectors for the years 1969, 1975 and 1978 by country in Latin America

Country	Area ('000/ha)					
	1969		1975		1978	
	Irrigated	Upland	Irrigated	Upland	Irrigated	Upland
Argentina	89.0	0.0	93.0	0.0	91.0	0.0
Belice	2.0	0.0	4.0	0.0	4.0	0.0
Bolivia	0.0	54.0	0.0	74.0	0.0	83.0
Brasil	1101.2	3686.8	791.8	4487.2	756.0	4644.0
Colombia	91.0	169.0	279.0	93.0	261.2	79.8
Costa Rica	2.2	41.8	2.9	84.1	3.3	59.7
Cuba	164.0	0.0	200.0	0.0	200.0	0.0
Chile	23.0	0.0	23.0	0.0	35.0	0.0
Ecuador	27.3	50.7	46.2	85.8	56.1	58.9
El Salvador	1.2	10.8	5.9	11.1	4.5	8.5
Guatemala	0.0	13.6	0.0	31.4	0.0	11.5
Guyana	-	-	120.0	14.0	95.8	39.5
Haiti	25.0	13.0	32.0	16.0	36.0	12.0
Honduras	0.9	8.1	2.2	15.8	4.8	19.2
Mexico	114.0	38.0	128.5	128.5	99.3	73.7
Nicaragua	5.2	20.8	15.0	15.0	11.6	3.4
Panama	0.8	104.2	1.1	113.9	3.4	111.6
Paraguay	-	-	-	-	19.5	10.5
Peru	110.0	30.4	100.3	22.2	93.5	28.5
Dominican Rep.	72.0	8.0	62.7	3.3	61.7	3.3
Surinam	-	-	-	-	49.0	1.0
Uruguay	34.3	0.0	46.9	0.0	58.3	0.0
Venezuela	24.0	96.0	43.5	70.5	111.3	36.7
Totals	1887.1	4345.4	1998.0	5265.8	2055.3	5284.5

Source: Gross data from FAO for area sown with estimates of the proportion in the two sectors obtained from participants at 3rd IRTP Conference at CIAT. May-June, 1979.

EXHIBIT 23

RICE YIELDS IN FIRST HARVEST AND RATTOON

CIAT - COLOMBIA 1978

VARIETY	YIELD (KG/HA)			
	1st HARVEST	RATTOON	RATTOON AS PERCENT OF FIRST HARVEST	TOTAL YIELD
CICA 8	6046	119	1.96	6165
CICA 9	5793	478	8.25	6271
Juma 57	5543	1566	28.25	7109
Tikal 2	5235	421	8.04	5657
Inti	4926	415	8.42	5341
CICA 4	4343	1456	33.52	5799
CICA 6	4256	700	16.44	4956
CICA 7	4233	991	23.41	5224
IR 8	2463	590	23.95	3053

Source: CIAT Annual Report 1978

EXHIBIT 24

RICE PLANTING AND HARVESTING ON THE VASQUEZ FARM, 1973
(5.6 hectares - 87 tareas[1])

ACTIVITY	DATE	AMOUNT HARVESTED (BAGS)	AMOUNT HARVESTED (KILOGRAMS)	YIELD (BAGS/TAREA)*	YIELD (KILOGRAMS/HECTARE)*	ESTIMATED DRY RICE YIELD (KILOGRAMS/HECTARE)**
PLANTING	Feb. 25					
1st HARVEST	June 15	367	34,830	4.5	6,403	5,874
2nd HARVEST	Sep. 24	265	23,850	3.0	4,385	4,023
3rd HARVEST	Dec. 10	185	16,650	2.1	3,600	3,303
TOTAL		835	75,330	9.6	14,388	13,200

[1] 1 Tarea = 1/16 hectare

* Yield reported by Vasquez was on wet paddy rice basis

** Estimated dry rice yield assumes a 12% humidity content for dry paddy rice, and a 21% humidity content for Vasquez wet paddy rice.