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PROMESA

Proyecto de Mejoramiento de Semilla

Final Report

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EXECUTIVE SUMMARY

PROMESA's MANDATE

PROMESA was the result of a USAID strategy formulated in the mid-1990s that identified improved varieties as a catalyst for increasing farm production, income, and investment. USAID identified bean seed as an unmet need of small-scale farmers and a marketing opportunity for seed companies. Development Alternatives, Inc. (DAI) designed PROMESA to help seed companies market to small- and medium-scale farmers, improve their access to seed of improved varieties, increase production, and sell in commercial markets. PROMESA focused on increasing the demand for certified seed and expanding commercial seed distribution channels.

PROMESA began field operations on September 10, 1998. Three months later, Hurricane Mitch hit Nicaragua, killing thousands and causing extensive damage in northern and central regions of the country. The storm destroyed the Postrera crop of farm-saved seed that most small-scale farmers plant. In response to the seed shortage, PROMESA's mission changed from providing technical and market information to replenishing the national seed supply. With \$600,000 from the U.S. Office of Foreign Disaster Assistance (OFDA), PROMESA imported 2,000 quintals (hundredweight) of hybrid maize seed and contracted with hundreds of small-scale farmers to produce 6,000 quintals of bean seed.

Under the terms of its agreement with OFDA, PROMESA established a revolving fund to finance post-harvest seed operations. In the three years after Hurricane Mitch, the fund turned over three times and financed a large portion of certified bean seed. USAID's post-Mitch agricultural credit program—Financiera Agricola (FinAg), managed under a cooperative agreement with the Cooperative League USA—financed other post-harvest operations. When USAID closed FinAg and the revolving seed fund in 2000, PROMESA helped seed companies seek credit from donors, microlenders, the Fondo de Credito Rural, and banks. In 2002, the Fondo de Credito Rural began financing post-harvest seed operations, but high interest rates and poor credit access continued to constrain seed sector development.

As PROMESA imported seed and helped farmer organizations establish seed companies, it experienced some problems constraining national seed sector development: scarce market and product information, limited access to credit, bureaucratic import delays, barriers to the introduction of new varieties, opportunities for collusion, and resistance of private voluntary organizations (PVOs) and nongovernmental organizations (NGOs) to hybrids. The seed relief program taught PROMESA how the national seed system works, particularly with respect to production and processing contracts, distribution networks, technical information, transaction costs, and market barriers. PROMESA also learned how the seed certification system works, including the capacity of the Ministry of Agriculture and Forestry (MAG-FOR) to certify seed, train seed producers, and test seed. The project learned about the scarcities of parent seed, the logistical constraints of extension services, and the proprietary attitude of the Instituto Nicaragüense de Tecnología Agropecuaria (INTA) toward client farmers. It

experienced gridlock between public institutions—for example, INTA’s refusal to pay MAGFOR to register new varieties, resulting in their unavailability to farmers. (See PROMESA’s “Assessment of Nicaragua’s Seed Sector” report.)

The post-Mitch seed shortage highlighted the weaknesses of the commercial seed system. The supply of parent seed stock was unreliable. The quality of certified seed was good, but many farmers perceived it to be inconsistent. High transaction costs discouraged new variety introductions. Product and market information was scarce. Seed demand depended on Government of Nicaragua (GON) and donor programs. USAID sharpened PROMESA’s mandate, which had originally included “artisanal” seed, to focus on problems of commercial markets for certified seed.

Post-Mitch seed relief programs had mixed effects on seed demand. PROMESA and its partner organizations, including donor-funded PVOs and NGOs, distributed seed to 10,000 farmers affected by Hurricane Mitch, creating a large-scale demonstration of improved varieties. Many farmers had opportunities to observe hybrids that tolerate drought better than crops grown from farm-saved seed. Donor demand for certified seed remained strong, but droughts in Primera 2000-2002 resulted in large maize seed inventories, forcing suppliers to reassess their product lines and marketing strategies.

SEED MARKETS

Market Segments. The major segments of the national market for certified seed are government programs, donor-funded PVO and NGO programs, and direct sales to farmers. GON and donor markets are attractive because of their accessibility to seed companies, the large average size of seed transactions, and low marketing costs. PROMESA lobbied to reprogram GON and donor seed procurement into commercial channels and encouraged seed companies to extend distribution channels to rural communities, with GON/donor programs providing technical assistance and seed information to small-scale farmers.

PROMESA focused on donor-funded extension programs managed by agricultural professionals with compelling reasons and adequate resources to buy high-quality certified seed, to disseminate technical information and seed. PROMESA showed them that instead of being too expensive, certified seed is an investment in a renewable resource that increases yields, reduces per-unit production costs, and raises farm income. In 2001, USAID refused to finance procurement of non-certified seed for its PVO/NGO programs. In 2002, other donor-funded programs also began using commercial seed channels rather than competing with national seed suppliers.

Production and Sales. When PROMESA began in 1998, Nicaragua produced only 75,000 quintals of certified seed, including 15,000 quintals of maize, bean, rice, and grain sorghum seed and 60,000 quintals of seed for oilseed crops: soybean, peanut, and sesame. By 2001, certified seed production had increased to 180,000 quintals. Annual sales of certified maize seed grew from 7,000 to 44,000 quintals. Certified bean seed grew from 400 to 10,000 quintals. Certified rice seed grew from 1,500 to 18,800 quintals.

The number of grain and oilseed varieties introduced annually grew from 5 to 18, and the number of varieties grown as certified seed increased from 27 to 41. The number of seed producers grew from 550 to 2,400, and many of them are small-scale farmers. The number of registered seed marketing organizations grew from 11 to 40, and more than 650 retail outlets sell certified seed in rural communities. Much of the growth in seed markets resulted from better marketing. Favorable farmgate prices also contributed to seed demand by creating incentives to invest in certified seed and complementary inputs. The implied demand for high-quality seed was strong, credit was tight, and regulatory agencies were small and underfunded. Nevertheless, the national seed system quickly evolved from where it had languished for more than a decade into a system capable of responding to changes in national and international markets. Sales of certified seed doubled from \$3 million to \$6 million (Table 1).

Table 1: Summary of Seed Market Growth

	1998	2002
Varieties grown as certified seed	27	41
New varieties introduced annually	5	18
Certified seed producers	550	2,400
Seed marketing organizations	11	40
Rural retailers selling certified seed	250	650
Certified seed sales (quintals)	75,000	200,000
Sales of certified seed	\$3 million	\$6 million

MARKET CHANNELS

Multinationals. Multinational seed companies such as Pioneer and Monsanto distributed seed through national importers/distributors, exercising their resource-based comparative advantages in hybrids and their competitive advantages with relatively large-scale Nicaraguan farmers. Seed importers kept their marketing costs low by selling seed through wholly owned or joint-venture distributors in the major towns located in grain production areas. When the Rural Development Bank closed in the mid-1990s, the demand for certified seed fell. Alternative GON/donor-funded credit programs gradually developed to address the needs particularly of small-scale farmers, and as credit shifted from large- to small-scale farmers, seed market channels also changed. Some importers closed their regional offices, which had catered primarily to large-scale farmers, and replaced them with rural retailers selling directly to small-scale farmers. Most rural retailers provided no credit, product information, or promotional or technical support. Nevertheless, they represented critical, sustainable links in seed market channels to small-scale farmers.

Gremios. Finding weak support among importers to invest in market channels to small-scale farmers, PROMESA turned to the major farmer organizations (*gremios*), including the Unión Nacional de Agricultores y Ganaderos (UNAG), Unión de Productores Agropecuarios de Nicaragua (UPANIC), and National Association of Rice Producers (ANAR), each of which had established seed companies in the late 1990s. UNAG and UPANIC were reluctant to invest in seed market channels so PROMESA trained them in marketing and strategic planning and encouraged them to use their membership networks as market channels.

Instead, they targeted GON/donor programs, following the low-cost marketing strategies traditionally used by importers. ANAR, in contrast, developed a successful seed company conducting field research, releasing proprietary varieties, maintaining parent seed stock, and selling both registered and certified seed.

After Hurricane Mitch, PROMESA helped seed producers establish regional seed associations with different mandates and types of members (Table 2). PROMESA took them on foreign study tours to clarify their roles in the national seed system. Seed associations gradually attracted new members and attempted to resurrect the Nicaraguan National Seed Producer Organization (APROSENIC) to represent them in the National Seed Council (CONASEM).

Table 2: Regional Seed Associations

ASORESEM, Western Seed Producer Association (Leon)	Represents relatively large producers of maize, peanut, and soybean seed who make up Nicaragua's modern seed sector. Provides technical information to improve seed quality and market information to access GON/donor markets. Participates in promotion programs to increase the use of improved varieties.
COOPPMAT, Matagalpa Potato Producers' Cooperative (Matagalpa)	Established by potato farmers seeking low-cost, disease-free seed. Expanded rapidly in response to bean seed demand by relief programs after Hurricane Mitch. Continues providing market access to GON/donor markets.
APROSUR, Asociacion de Productores de Semillas del Sur (Carazo)	Helps nurseries improve production and marketing methods and access to new seed and planting materials.
COOPROSEC, Seed Producer Cooperative (Carazo)	Established as a marketing cooperative for small seed producer cooperatives.
APROSEN, Northern Association of Seed Producers (Estelí)	Represents seed producers in Estelí and Matagalpa.
APROSENIC, National Seed Producers' Association	Currently inactive.

SEED POLICIES

After Hurricane Mitch, PROMESA forged effective relationships with private stakeholders—seed importers, producers, processors, and distributors—but its relations with regulatory institutions were weak. One major area of disagreement between PROMESA and MAGFOR, its principal counterpart, was the composition of CONASEM.

CONASEM. The 1998 National Seed Law established CONASEM as a forum for seed policy discussions. It provided seven seats to public institutions, one to universities, and two to producer associations (UNAG and UPANIC, each with its own seed company); but only

one seat for the seed industry. When MAG-FOR requested support in convening CONASEM, PROMESA argued that a National Seed Council where seed companies were underrepresented would be ineffective. PROMESA eventually relented, acknowledging that a poorly designed National Seed Council might be better than none at all. In April 2001, after mounting pressure from seed companies, MAG-FOR convened CONASEM. In February 2002, four years after its establishment by the Seed Law and nine months before PROMESA ended, CONASEM began meeting regularly to address seed policy (Table 3).

Table 3: Summary of Policy Changes

National Seed Council (CONASEM) convened	2001
Plant variety protection law passed	2000
Membership in UPOV	2001
Regional seed trade standards harmonized	Pending approval
Seed service accreditation system	Pending approval
Seed registration cost reductions	2000
Agricultural Technology Project seed program redesigned	2002
National Biosafety Commission to evaluate biotech products	Pending approval

Plant Variety Protection (PVP). PVP systems create incentives for breeders to commercialize new varieties and facilitate trade of proprietary varieties and hybrids. Members of the World Trade Organization are required to provide intellectual property rights protection for new crop varieties. Nicaragua's PVP law, passed in 2000, provides ownership rights over improved varieties so plant breeders and the institutions they work for can reap benefits from their technological innovations. Nicaragua's PVP law is consistent with the guidelines of the Union Internationale pour la Protection des Obtentions Végétales (UPOV), and Nicaragua joined UPOV in 2001.

Seed Trade Harmonization. PROMESA helped MAG-FOR harmonize seed trade standards throughout Central America. The Ministry of Industry and Commerce (MIFIC) incorporated the seed agreement—Regional Harmonization of Field Trials and Laboratory Standards for Seed Varieties—into ongoing negotiations at the Union Aduanero Centroamericano (UAC) to reduce costs and stimulate trade.

Accreditation. PROMESA helped MAG-FOR design a program for accrediting seed laboratories to test seed quality and seed companies to certify seed. The program will increase the abilities of seed companies and MAG-FOR to respond to changes in seed markets.

Variety Registration. In 2002, MAG-FOR cut fees for new variety registrations by 50 percent.

AGRICULTURAL BIOTECHNOLOGY

PROMESA's biotechnology program began after the PVP law passed in 2000. PROMESA provided experts to help MAG-FOR assess Nicaragua's technical infrastructure and legal framework to determine its ability to regulate agricultural biotech products. The results provided the basis for PROMESA's biotech program. PROMESA helped MAG-FOR design a regulatory framework that separates science-based environmental risk assessments from socioeconomic considerations and prevents political and philosophical considerations from interfering with environmental impact assessments.

Before PROMESA, most mass media coverage of biotechnology involved misinformation and sensationalism. PROMESA launched an information campaign to increase public awareness of agricultural biotech products. Technical audiences, including policy makers, field technicians, universities, and producer organizations, received information seminars, workshops, and a twice-monthly bulletin called *Biotecnologia*. The general public received information through weekly newspaper articles. The campaign encountered strong opposition from two local groups that tried to frighten consumers and create a popular groundswell against biotechnology, hybrids, multinationals, and globalization. Their strategy, based on misinformation released to the national press, was less credible than PROMESA's science-based newspaper articles, seminars, and *Biotecnologia*. Abandoning their "Frankenfoods" strategy, opponents used more sophisticated arguments, thereby changing the terms of the biotechnology debate and paving the way for a National Biosafety Commission.

HIGHLIGHTS

Hurricane Mitch. PROMESA helped national seed companies and importers respond to relief programs.

GON Seed Programs. MAG-FOR's National Assistance Program for Small Producers (PNAPP) converted to certified seed in 2001. PROMESA helped MAG-FOR design the three-year Libra por Libra Program in 2002, extending seed market channels to rural communities. MAG-FOR and the Instituto de Desarrollo Rural committed to purchase more than \$3 million of certified seed during 2002-2004.

Donor Programs. In the long term, donor programs are an unsustainable basis for seed industry development. Ultimately, seed companies must learn to sell directly to farmers. In the short term, however, donor programs can play important roles in expanding seed distribution channels and helping farmers finance high-quality seed. PROMESA used technical training and promotional events to train donor technicians and help donors convince farmers to adopt certified seed. PROMESA encouraged GON/donors to reinforce market mechanisms by buying imported hybrids, contracting with national seed companies to produce certified seed of open-pollinated varieties, and distributing this seed to small-scale farmers through rural retailers.

Seed Policy. PROMESA's technical assistance to MAG-FOR and MIFIC resulted in the establishment of a National Seed Council, passage of a PVP law, harmonization of Central American seed trade standards and regulations, accreditation of private seed laboratories and certification programs, and lower seed registration costs:

- **Plant Variety Protection.** PROMESA helped MAG-FOR and MIFIC design a PVP law to protect the intellectual property rights of plant breeders so they, and the institutions they work for, can reap benefits from their innovations.
- **Harmonization.** PROMESA helped MAG-FOR negotiate common seed trade standards in Central America. MAG-FOR and MIFIC expanded the regional seed agreement—Regional Harmonization of Field Trials and Laboratory Standards for Seed Varieties—to include other products.
- **Accreditation.** PROMESA helped MAG-FOR design a program for accrediting seed laboratories to test seed quality and seed companies to certify seed. The program will increase seed companies' abilities to respond to changes in seed markets.
- **Variety Registration Costs.** PROMESA successfully advocated for the reduction of MAG-FOR's fees for new variety registrations by 50 percent, and UAC negotiators proposed to eliminate seed tariffs and registration costs.
- **Agricultural Biotechnology.** PROMESA helped change the terms of the biotechnology debate, which paved the way for the establishment of a National Biosafety Commission.

Policy Debate. PROMESA expanded its seed promotion activities to electoral campaigns to explain the benefits of improved varieties and hybrids. Campaign promises to provide improved varieties resulted in MAG-FOR's *Libra por Libra* Program.

Adoption of Certified Seed of Improved Varieties. During 1998-2002, PROMESA promoted all improved varieties and hybrids registered at MAG-FOR. The volume of certified seed planted, including basic grains and oilseed crops, increased from 75,000 to more than 200,000 quintals. The number of new varieties registered with MAG-FOR increased annually from 5 in 1998 to 18 in 2002.

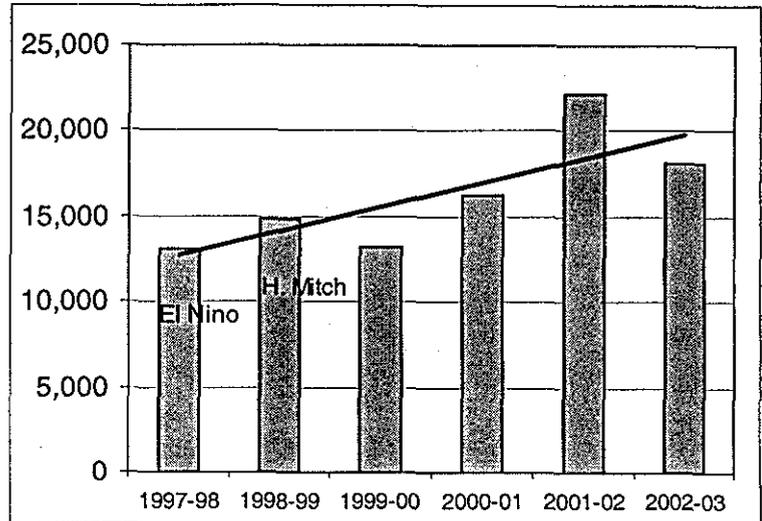
Competitive Conditions. During 1998-2002, the number of seed companies increased from 11 to 40. A growing proportion of certified seed went through rural retailers to small-scale farmers, and farmers, rather than GON/donor field technicians, increasingly made seed choice decisions.

Seed Imports. Previously, multinational companies minimized their marketing costs by exercising their comparative advantages in hybrids and competitive advantages with large-scale farmers. Foreign investment in the seed sector is responding to increased demand by small-scale farmers and sales opportunities created by the *Libra por Libra* Program.

Market Size. The volume of certified seed sales increased from 75,000 to more than 200,000 quintals. Seed sales grew from \$3 million to \$6 million. Without GON and donor programs crowding out direct sales to farmers, the potential size of the seed market is about 60,000 farmers purchasing \$12 million of seed annually.

Impact on Grain Production. The increased use of certified seed during 1998-2002 resulted in hardier crops and higher yields under both favorable and adverse conditions. Higher yields, lower crop losses, and expanded production areas for maize, beans, and peanuts resulted in national grain production increasing from 15 to 22 million quintals (Figure 1).

Figure 1: National Grain Production—Maize, Beans, Rice, Sorghum, Sesame (thousand quintals)



CHAPTER ONE SEED MARKETS

Efficient national seed markets depend upon effective relationships between public and private stakeholders. The relationships between MAG-FOR, INTA, donors, seed companies, and financial institutions are evolving, and new market channels are developing. These relationships are increasingly conducive to private seed sector development.

Donors. In the 1990s, donors played a major role in Nicaraguan agriculture reaching disadvantaged farmers and responding quickly to their needs. Their integrated rural development strategies addressed a range of factors affecting rural development. However, the linkages between some donors and the wider national economy, including suppliers of agricultural inputs, often were weak. In the mid-1990s, before PROMESA, MAG-FOR developed a National Seed Plan calling for seed companies to produce more seed; but the plan did not address how seed would be sold. In contrast, the 2002 National Seed Plan calls for private companies to market seed directly to farmers. While GON and donor programs remain major players in national seed markets, their influence over seed choice decisions is diminishing as seed companies improve their marketing programs and sell more seed to small-scale farmers. A simplified schematic of how the seed sector operates is presented in Annex A.

INTA. As in many countries, large-scale farmers in Nicaragua buy high-value hybrid seed from multinational seed companies. Small-scale farmers and most open-pollinated varieties are the responsibility of national seed programs like INTA. INTA participated in many PROMESA seed fairs and field days where it had opportunities to compare technology transfer methods and meet informally with donors to promote its new role as a “second tier” technical assistance provider, an important component of INTA’s new extension strategy. INTA also met with seed companies to assess their demand for parent seed. To stimulate demand for INTA’s parent seed, PROMESA helped INTA launch new varieties, multiply parent seed, and promote the use of seed production contracts. PROMESA trained groups of small-scale farmers who were producing seed under INTA’s supervision for their local communities to establish new market linkages and develop their artisanal seed programs into commercial seed companies selling certified seed nationally and internationally.

Promotion and Training. To increase seed sales to small-scale farmers, PROMESA trained hundreds of field technicians from dozens of GON/donor programs to plant variety demonstrations and hold field days. More than 10,000 small-scale farmers attended these activities, which provided the basis for PROMESA’s seed promotion program. PROMESA helped donor programs¹ establish variety demonstrations on the farms of innovative producers, who tend to manage their crops more intensively than their neighbors, using more fertilizer and better pest control methods. Under these conditions, improved varieties and

¹ ACTED, ADRA, AGANORSA, Ayuda en Accion, CIAT-Laderas, COCABO, CONOR-380, COONORTE, COOPPMAT, CRS/Caritas-Jinotega, EMVITECO, INPRHU, PCI, Save the Children, Setagro S.A., and individual farmers.

hybrids clearly demonstrated their superiority. Variety demonstrations provided opportunities for farmers to observe the performance of new seed products under local conditions and for GON/donor programs to transfer technologies to their clients.

At field days, PROMESA helped farmers compare the agronomic characteristics of new seed products and field technicians talked with farmers about the new varieties and hybrids. Seed companies met with potential buyers, including farmers and GON/donor programs. At workshops on variety performance criteria and field data collection, technicians from GON/donor programs met their counterparts in INTA and seed companies, INTA-backed technical assistance companies promoted their technical services to technicians from donor programs, and INTA met with seed companies to promote its parent seed.

Seed Market Indicators

Figure 2: Certified Maize Seed Production (quintals)

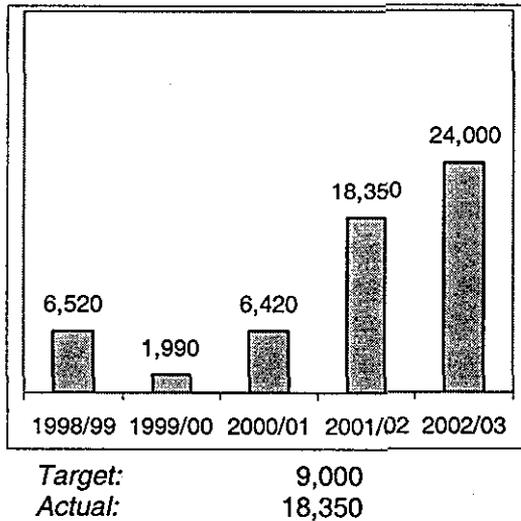


Figure 3: Rural Retailers Selling Certified Seed in 2002

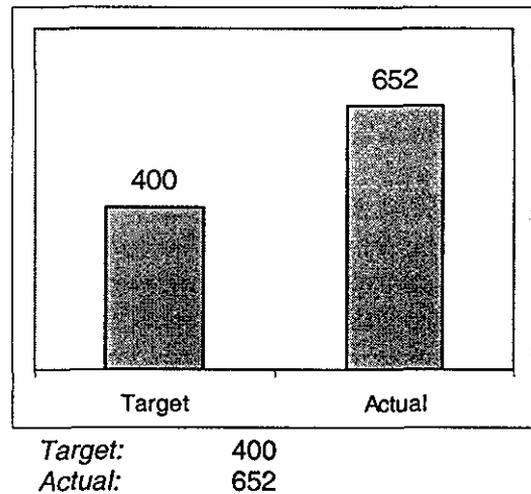


Figure 4: Number of Field Days in 2001/02

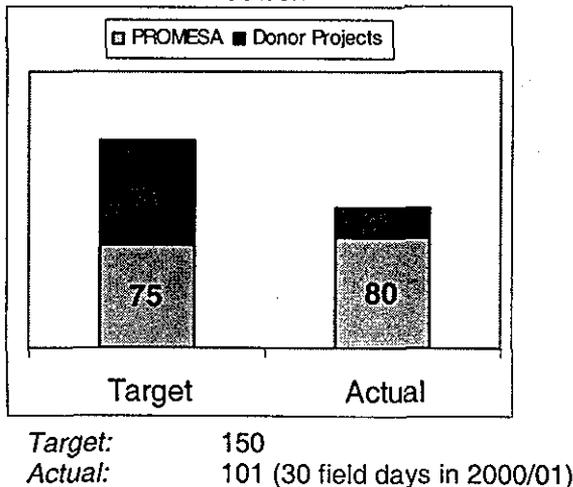
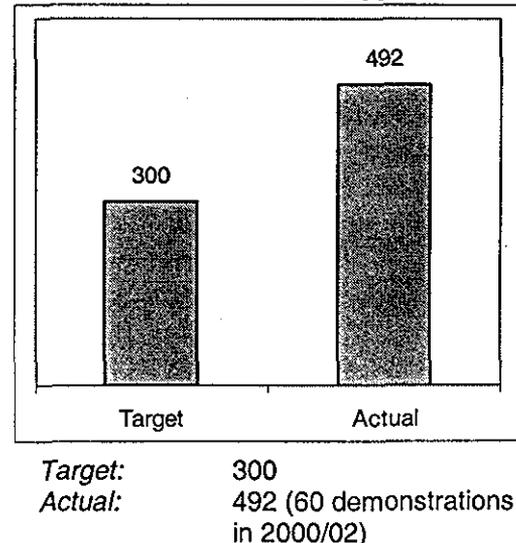


Figure 5: Number of Variety Demonstrations in 2001/02



IMPORTERS

The Association of Agrochemical Formulators and Distributors of Nicaragua (ANIFODA) represents importers of agricultural inputs. In addition to seed from multinational companies, most ANIFODA members sell imported fertilizers, pesticide, and equipment. Seed sales represent only a small portion of their total sales. Seed markets languished in the 1990s, in part because importers failed to aggressively promote seed to large-scale farmers or to market it to small-scale farmers. Importers kept marketing costs low by selling through wholly owned or joint-venture distributors located in departmental capitals and major grain production areas. The costs and risks of marketing seed to large-scale farmers, GON/donor programs, cooperatives, and other farmer organizations were relatively low, but their demand for seed was unpredictable, sometimes resulting in large inventories held for extended periods, raising storage costs, lowering seed quality and crop yields, and dampening consumer confidence in certified seed.

In 1998, when PROMESA began, most seed importers were reluctant to invest in new market channels. Extending market channels to small-scale farmers required different information, marketing, and distribution systems, and additional investment. Instead, they chose to reduce marketing costs by relying on GON/donor programs to distribute seed to small-scale farmers. Changes in agricultural credit conditions eventually forced them to abandon this low-cost, low-risk marketing strategy. By 2002, importers were targeting the small-scale farmer market, closing distributorships and marketing seed through hundreds of small rural retail outlets modeled after a Guatemalan (*agroservicios*) seed distribution system.

Seed Import Indicators

Figure 6: Certified Seed Planted/Basic Grains and Oilseed Crops (quintals)

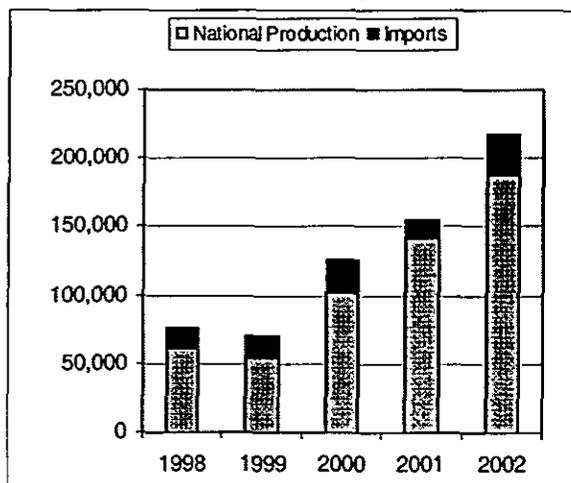


Figure 7: Seed Importers Registered at MAG-FOR in 2001/02

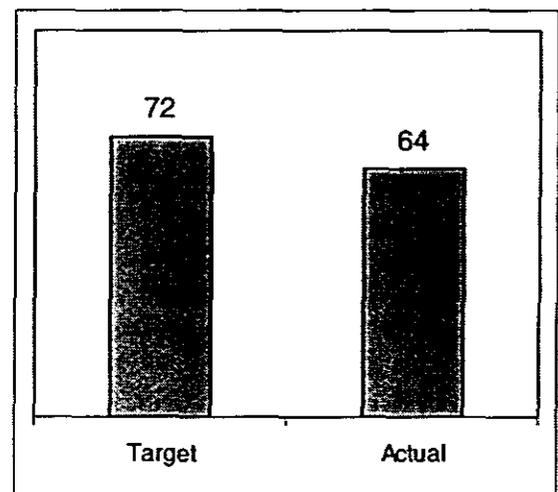


Figure 8: Seed Import Permits

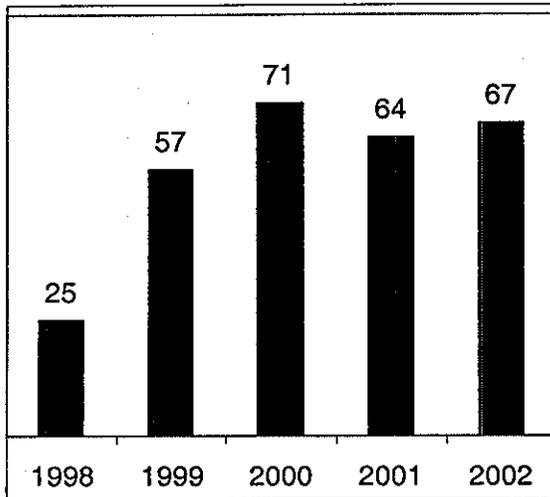
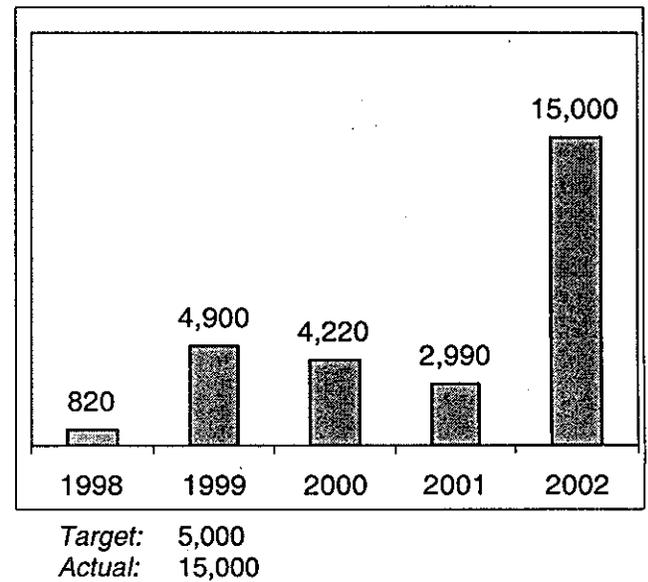


Figure 9: Volume (quintals) of Hybrid Maize Seed Imported



FARMER ORGANIZATIONS

Finding weak support among importers to extend market channels to small-scale farmers after Hurricane Mitch, PROMESA turned to the major farmer organizations (*gremios*), Unión Nacional de Agricultores y Ganaderos (UNAG), Unión de Productores Agropecuarios de Nicaragua (UPANIC), and National Association of Rice Producers (ANAR), each with its own seed company. PROMESA trained them in strategic planning and marketing and encouraged them to use their networks of rural offices as seed market channels. Both UNAG and UPANIC were reluctant to invest in market channels to small-scale farmers, choosing instead to follow the low-cost marketing strategies of seed importers and to focus on GON/donor programs. Despite the rapid growth of UNAG's Agronegsa, established in 2002 to provide seed and other products and services to small-scale farmers, into a leading seed company contracting with small seed producers and marketing to GON/donor programs, UNAG's potential as a seed market channel remains largely untapped. ANAR, in contrast, developed a successful seed company that tests new varieties and sells both certified and parent seed of proprietary varieties.

REGIONAL SEED ASSOCIATIONS

Several farmer organizations established commercial seed companies during 1998-2002 to take advantage of donor demand for certified seed and position for long-term market growth. PROMESA helped them organize regional seed organizations, each with different types of members and mandates. PROMESA took them on study tours to Costa Rica, El Salvador, Guatemala, Peru, and Bolivia to help clarify their roles in the national seed system.

PROMESA also helped them organize promotional events to increase the use of certified seed. These events attracted new members to the associations and renewed interest in resurrecting the national seed organization—Association de Productores de Semilla de Nicaragua (APROSENIC)—to represent them in CONASEM.

- **ASORESEM.** The Asociacion Regional de Semillas (ASORESEM), based in Leon, represents Nicaragua's modern and mechanized seed sector, members include cooperatives and relatively large producers of maize, peanut, and soybean seed. ASORESEM provides market and technical information to improve seed product quality.
- **COOPPMAT.** Small-scale farmers seeking low-cost, disease-free potato seed founded the Cooperativa de Productores de Papa en Matagalpa (COOPPMAT). Recognizing an opportunity to sell seed to relief organizations after Hurricane Mitch, COOPPMAT contracted with hundreds of small-scale farmers to produce bean seed, and continues to provide its members with access to GON/donor markets.
- **APROSUR.** The Asociacion de Productores de Semillas del Sur (APROSUR), based in Carazo, is made up of nurserymen (fruit and coffee seedlings, flowers, and ornamentals). Its mandate is to improve production and marketing methods and provide access to new varieties, seed, and planting materials.
- **COOPROSEC.** In 2002, seed producers in Estelí and Matagalpa established the Asociacion de Productores de Semillas del Norte (APROSEN). Seed producers in Carazo established the Cooperativa de Productores de Semilla de Carazo (COOPROSEC), composed of 80 farmers who switched from artisanal to certified bean seed production.
- **APROSENIC.** The National Seed Producer Association (APROSENIC) was established in the mid-1990s to represent all Nicaraguan seed companies in CONASEM but is currently inactive.

SEED PRODUCER GROUPS

In the mid-1990s, INTA and several donors undertook programs to improve farmers' access to improved varieties. These GON/donor programs encouraged small-scale farmers to produce high-quality, low-cost seed using artisanal methods. Some farmer groups that began producing artisanal seed for their local communities eventually evolved into commercial seed enterprises marketing certified seed in national and international markets. PROMESA helped eight groups of seed producers, including six seed producer groups working with INTA and the Ministry of Labor, to hold marketing workshops for farm organizations and advocate that INTA stop marketing seed that competes with seed companies.

INTA Seed Indicators

Figure 10: Number of INTA-Backed Groups Producing Certified Seed in 2001/02

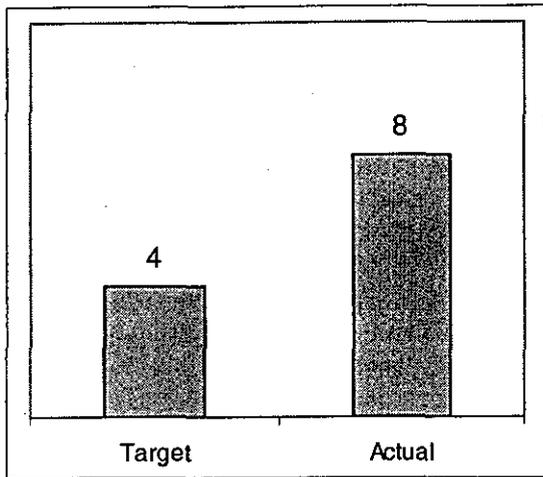
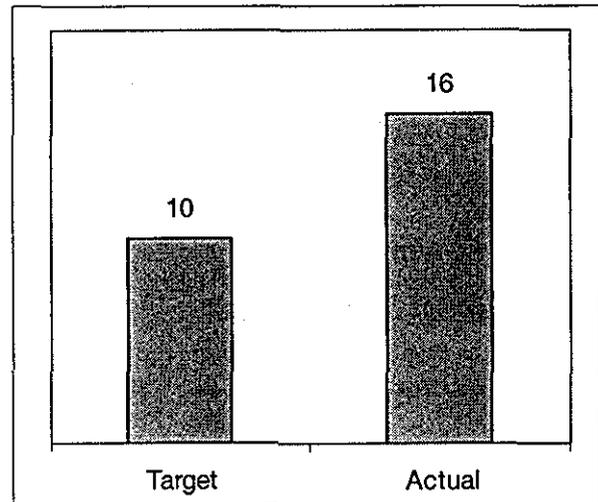


Figure 11: Production Contracts between INTA and Seed Producers in 2001/02



NATIONAL SEED COMPANIES

The drought in Primera 2001 caused a shakeout of the seed industry. Seed companies formed strategic alliances to increase efficiency and cut costs by specializing in different aspects of seed production and marketing. Nevertheless, the number of seed companies continued to grow (Figure 13), resulting in more seed delivered to farmers through commercial channels, rather than through GON/donor programs; increased demand for seed; importers marketing more seed; and sustainable national seed companies increasingly competitive in foreign markets.

Figure 12: Certified Seed Production in 2001/02 (quintals)

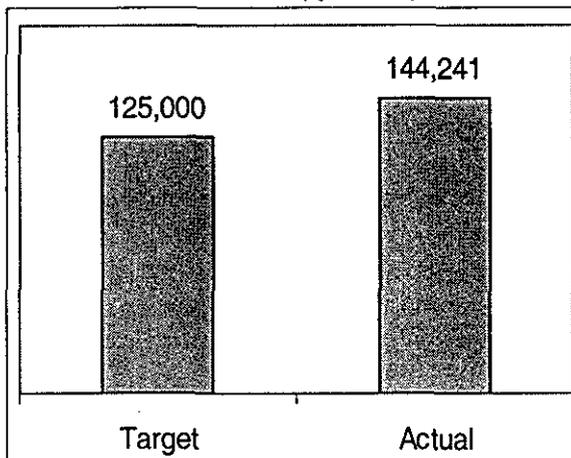
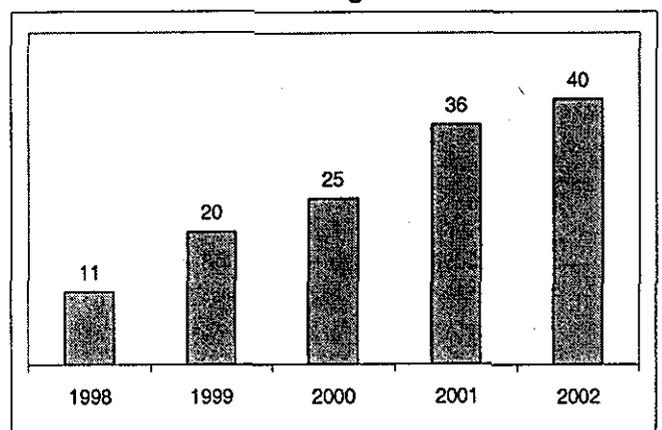


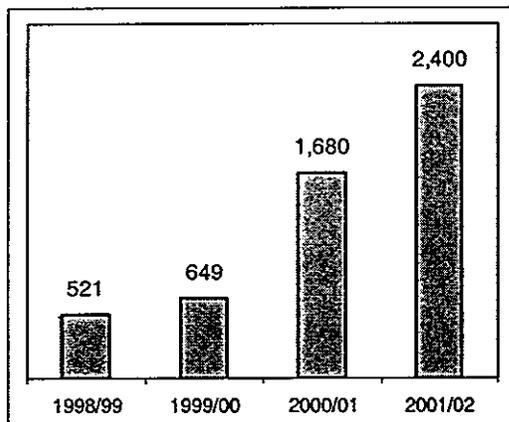
Figure 13: Seed Producer Organizations Marketing Seed



PROMESA identified rural seed retailers—many of them established during PNAPP's 2000-2001 farm input subsidy program—as the weakest link in seed market channels. Rural retailers sell mostly tools and crop protection products. Some provide short-term credit. They do not advertise or hold field days to promote new technologies. Nevertheless, PROMESA recognized rural retailers as an important channel for technical information. PROMESA and PTA planted variety demonstrations, provided technical training, and shared advertising and promotion costs to help rural retailers increase seed sales to small-scale farmers. PROMESA helped design MAG-FOR's *Libra por Libra* program, discussed below, which requires seed companies to establish rural retail outlets to sell to small-scale farmers, thereby reducing dependence on GON/donor programs and increasing national seed sales.

Seed Company Indicator

Figure 14: Number of Farmers Producing Certified Seed



Target: 2,000
Actual: 2,400 (1,700 in 2000/01)

AGRICULTURAL TECHNOLOGY PROJECT (PTA)

The World Bank-funded *Proyecto de Tecnología Agrícola (PTA)* was designed to accelerate technology transfer to small-scale farmers over a 16-year period, beginning in 2000. PTA recognized the opportunity to add value to grain production by producing and marketing it as seed. PROMESA helped redesign PTA's seed program to promote the use of certified seed, support market-oriented policy reforms, and reduce the role for INTA's artisanal seed program. To help PTA organize small seed producers into marketing organizations, PROMESA expanded its training programs for seed producer groups by providing market information and training in quality control, helping them gain legal status as commercial organizations, and suggesting distribution strategies to reach more small-scale farmers. Coordination between PTA and PROMESA resulted in many more small-scale farmers producing certified seed under *Dirección General de Semillas (DGS)* supervision

and, ultimately, increasing yields in fields planted with certified seed. By 2002, eight INTA farmer groups were producing certified seed (see Figure 10).

By strengthening the commercial seed system, PTA's National Seed Plan (PNS) increased the long-term rate of adoption of improved varieties. PNS called for the use of certified seed to increase yields of basic grains and oilseed crops produced by small- and medium-scale farmers. Consistent with PROMESA's seed policy initiatives, PNS called for increased DGS autonomy within the Animal and Plant Health Department (DGPSA), financial sustainability, a seed accreditation system, a new National Seed Law, a National Biosafety Commission, reduced seed registration fees, and improved regulatory efficiency. PROMESA suggested ways to stimulate the national seed system, increase competition, upgrade the management skills of seed companies, increase parent seed production, improve regulatory efficiency, and provide seed product information to small- and medium-scale farmers. PROMESA also provided regulatory information to seed marketing organizations and legal advice to MAG-FOR to update its seed regulatory framework.

LIBRA POR LIBRA

An important element of the PNS is the GON's 2002-2004 Libra por Libra Program, which is distributing certified seed to 100,000 small- and medium-scale farmers. PROMESA helped MAG-FOR design Libra por Libra's distribution system, based on coupons distributed by donor programs, farmer organizations, and INTA. The program relies on seed companies to establish rural retail outlets to sell seed to coupon holders. PROMESA surveyed rural retailers in the major production areas to determine the limits of seed market channels and to identify new rural retailers. PROMESA helped MAG-FOR determine the amount of seed to distribute and the areas where it would have the most impact on production. PROMESA helped ensure adequate supplies of certified seed and advocated for future seed production to be based on contracts between MAG-FOR and seed companies.

PTA expects Libra por Libra to stimulate grain production and crop diversification. Farmers who plant certified seed can increase yields and maintain grain production while diversifying into other crops and expanding into processing activities. PTA expects average yields to increase as a result of certified seed: from 25 to 41 qq./mz. for maize, from 10 to 14 qq./mz. for beans, from 30 to 41 qq./mz. for grain sorghum, and from 43 to 73 qq./mz. for upland rice. (See "An Assessment of Nicaragua's Seed Sector.") If Libra por Libra results in a pure production effect without affecting prices or planting decisions, average farm income will increase by \$108, to \$250 per year, increasing national grain production by 60 percent. However, if farmers plant smaller production areas to maintain the same volume of grain production, the program will divert 43,000 manzanas from grain production to other crops.

In Primera 2002, 44,000 farmers in 17 departments and 121 municipalities bought 23,770 quintals of certified seed, enough to plant 60,000 manzanas of maize, beans, rice, and sorghum. Regardless of whether this massive demonstration results in sustained demand for certified seed, Libra por Libra will extend commercial seed market channels to rural

communities in the major grain production areas. Even if seed demand falls when donors withdraw, these market channels, once established and tested, will be sustainable.

CHAPTER TWO SEED POLICIES

The high quality of Nicaragua's certified seed is an important potential competitive advantage in foreign markets. MAG-FOR recognizes that national seed companies do not need stricter regulatory controls or protection from foreign competitors. Instead, they need to sharpen their competitive skills in national markets, exploit comparative advantages in foreign markets, and define self-imposed quality standards. They need competitive national markets and discerning customers who demand high-quality seed of high-yielding varieties. They need to lower market transaction costs caused by opportunism and poor market information. They need credit for post-harvest seed operations and effective industry associations that can influence public policies.

During 2000-2001, using \$625,000 of supplemental funds from USAID's Hurricane Mitch Rehabilitation Program, PROMESA and MAG-FOR's DGS expanded the initiative to modernize the policy framework of the national seed system, increase services to seed companies, and facilitate access to seed markets. They hosted training and promotional activities designed to increase farmers' seed knowledge and choices, stimulate agribusiness investment, diversify agricultural production, and increase seed company participation in seed policy discussions.

CONASEM

The 1998 National Seed Law established a national seed council, CONASEM, as a forum for seed policy discussions. The Seed Law provides 11 seats to public institutions, universities, and producer associations (UNAG and UPANIC, each of which operated seed companies), but only one seat specifically to the seed industry. PROMESA and MAG-FOR disagreed about its composition. PROMESA maintained that an effective National Seed Council would require greater seed industry participation and that active seed markets and the growing number and importance of national seed companies called for their participation in policy discussions. After 18 months of fruitless debate, PROMESA relented, acknowledging that a poorly designed national seed council might be better than none at all. In April 2001, MAG-FOR convened CONASEM. In 2002, CONASEM began meeting to discuss seed policies.

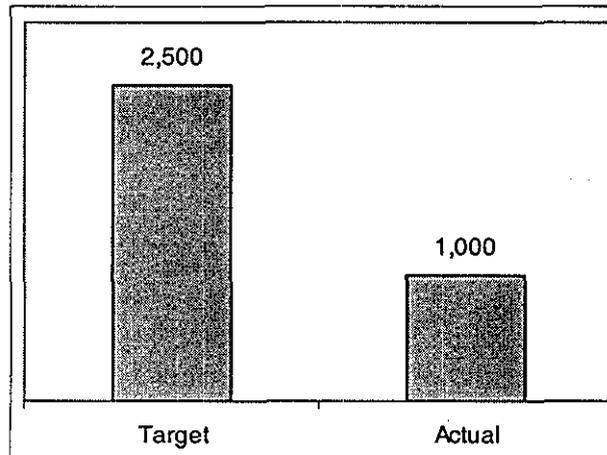
PROMESA conducted workshops to help CONASEM define its operating procedures, identify priorities, analyze seed policies, and present recommendations to higher-level decision makers. PROMESA helped ASORESEM represent the interests of seed companies in CONASEM, while advocating for expanding CONASEM's permanent membership to include financial institutions and more seed industry representatives.

In its first six months of operation, CONASEM appointed working committees where seed companies are taking leading roles. One committee, for example, is identifying changes needed in the National Seed Law in order to change the composition of CONASEM, allow MAG-FOR to accredit private seed certifiers, and eliminate requirements that all commercial

seed be certified, CONASEM hosted the 2002 National Seed Conference, providing opportunities to increase private sector participation in seed policy formation and encourage seed companies to regulate their own industry.

Seed Policy Indicators

Figure 15: Number of Seed Producers Represented in CONASEM



- Seed Sector Assessment (1.8-a). (Completed: “Assessment of Nicaragua’s Seed Sector.”)

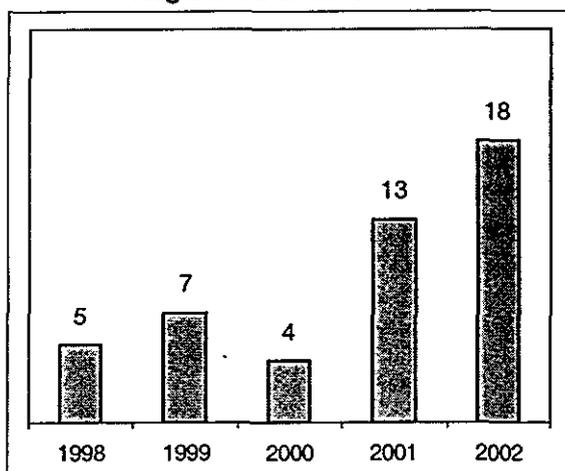
VARIETY INTRODUCTIONS

MAG-FOR decides what varieties can be sold in Nicaragua. INTA and a regional testing organization called PCCMCA test most new varieties. Despite increased demand for certified seed and greater competition in seed markets, the transaction costs of seed certification and imports are high and bureaucratic bottlenecks constrain variety introduction. PROMESA helped MAG-FOR reduce seed trade barriers by harmonizing seed standards in Central America (see next section).

When PROMESA began in 1998, farmers selected from a narrow range of about 30 improved varieties of basic grains and oilseed crops, many of them outdated. By 2002, MAG-FOR had changed its policy from “protecting” farmers from allegedly unscrupulous multinationals to facilitating farmers’ seed choice decisions. It lowered registration fees for new varieties and loosened testing requirements. In 2000, MAG-FOR cut variety registration fees from \$500 to \$200. In 2002, it supported a UAC proposal to eliminate seed import taxes and cut annual seed company registration fees from \$200 to \$40. By 2002, seed importers, national seed companies, and INTA had introduced 42 new grain and oilseed varieties and hybrids.

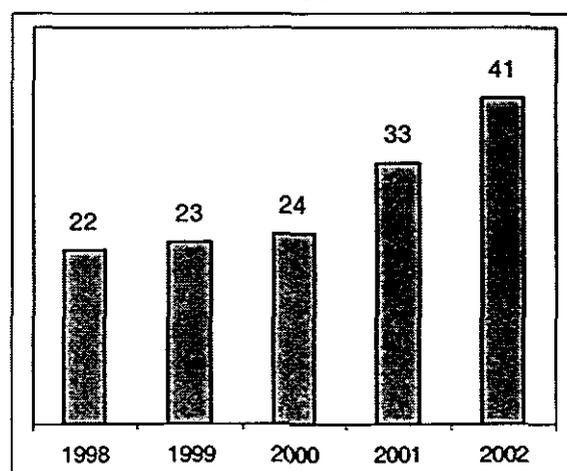
Variety Introduction Indicators

Figure 16: Number of New Varieties Registered at MAG-FOR



Target: 10
Actual: 18

Figure 17: Number of Grain and Oilseed Varieties Produced as Certified Seed



Target: 40
Actual: 41

HARMONIZED SEED TRADE

In 1999, PROMESA joined MAG-FOR and the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) in a series of technical meetings that resulted in an international ministerial agreement to harmonize seed trade standards in Central America. MIFIC incorporated the "Regional Harmonization of Field Trials and Laboratory Standards for Seed Varieties" into UAC negotiations to harmonize trade standards for a wide range of products. PROMESA provided technical analysis to MAG-FOR to negotiate the new regulations. To date, these negotiations have only delayed the implementation of the original seed harmonization agreement (see indicators below), but the broader UAC agreement, for which the seed standards serve as a model, will have far greater impact in 2004.

To increase farmers' confidence in the quality of certified seed, DGS helps seed companies improve production and quality control. As the ultimate regulatory authority, DGS continues to define standards, but reduced its role in enforcing them, spending less time supervising seed production and more on monitoring seed markets. PROMESA developed a seed tag control program to ensure that seed is properly tagged, and helped DGS conduct the initial rounds of spot-checks in Apante 2001 and Primera 2002.

Trade Harmonization Indicators

- Seed tag spot-checks conducted by MAG-FOR: Apante 2001 and Primera 2002 (1.3-a). (Completed.)

- Seed tag audits (1.3-b). **(Completed.)**
- Harmonized tariffs, phytosanitary standards and regional seed tags (1.4-a and b). **(Pending UAC negotiations.)**

ACCREDITING SEED SERVICE COMPANIES

As seed demand increased, MAG-FOR's certification services quickly reached capacity. DGS did not have the resources to inspect all the small, scattered fields of bean seed and deliver seed laboratory results in a timely manner. Unable to raise certification fees or increase its operating budget, and unwilling to deny certification services to small producers, DGS loosened its field inspection requirements. PROMESA assisted DGS in training seed producers and giving them some of DGS's quality control responsibilities.

PROMESA also helped increase MAG-FOR's certification capacity by developing a program to accredit private organizations to test and certify seed. The objectives of the program were to create private service companies responsive to changes in seed demand and to encourage seed companies to define their own quality control systems. PROMESA held workshops on seed testing and certification, and provided technical assistance to laboratories and seed companies to meet accreditation requirements. PROMESA helped MAG-FOR and MIFIC define coordinated operating procedures to implement the accreditation program. When PROMESA ended, all requirements for accreditation were in place. Once MAG-FOR and MIFIC agree to implement the program, service companies—including two seed laboratories (INTA and UNA) and four seed companies (SAGSA, ECAGE, UNICAFE, and ANAR)—are prepared to apply for accreditation.

Accreditation Indicator

- Seed companies and laboratories accredited for seed certification and testing (1.2-a). **(Pending MIFIC/MAG-FOR negotiations.)**

PLANT VARIETY PROTECTION

Plant variety protection is a special application of intellectual property rights, providing ownership rights incentives to plant breeders, crop breeding programs, and seed companies to develop and release new varieties. Many industrialized and Latin American countries have PVP systems and members of the World Trade Organization are required to provide intellectual property rights protection for new crop varieties.

PROMESA conducted an extensive pro-PVP public relations campaign involving technical seminars at universities and regulatory agencies, meetings with stakeholders in the agricultural sector, and seminars on seed sector development and trade policies. In 2000,

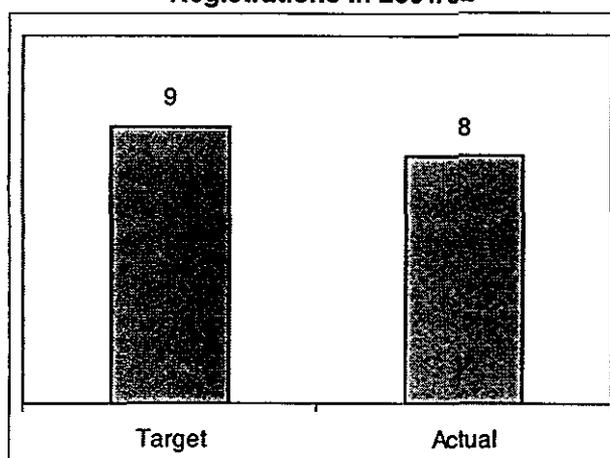
after considerable public debate, the National Assembly passed a PVP law. In 2001, Nicaragua became a member of Union Internationale pour la Protection des Obtentions Végétales (UPOV).

PROMESA helped the PVP Qualifying Committee define variety descriptors to use in determining whether varieties are new, homogeneous, stable, or different and provided technical assistance to audit the system to ensure that it met UPOV standards. PROMESA helped MAG-FOR and MIFIC define application and registration procedures and coordinate their PVP programs, and showed the Ministry of the Environment and Natural Resources (MARENA) the potential beneficial role of PVP in maintaining biodiversity. The legal and administrative frameworks are in place. MIFIC received seven applications during 2001-2002. The University of North Carolina submitted the first PVP application to protect a tobacco variety. INTA applied for protection of three varieties (high protein maize hybrid, INTA-Dorado rice, and INTA-2000 sesame) and plans to register more in 2003. PROMESA helped ANAR register ANAR-97, the first variety protected under the PVP law, which quickly developed into a popular new rice variety in Nicaragua.

The potential benefits of Nicaragua's PVP law are far-reaching. PVP systems motivate breeders and seed companies to release new varieties, stimulate competition in seed markets and increase seed alternatives for farmers. But PVP laws are not the only, or even the most important, requirement for protecting plant breeders' rights; appropriate regulations, transparent procedures, and credible agencies to enforce them also are required. When all of these conditions exist, PVP laws provide important incentives to breeders and seed companies to release new varieties, but foreign seed companies may remain reluctant to introduce proprietary varieties in Nicaragua until its PVP law is tested in the courts.

PVP Indicators

Figure 18: Number of Applications for PVP Registrations in 2001/02



Expanding seed promotion activities to meetings with electoral campaigns to explain the benefits of improved varieties and hybrids (1.8-b).

Target: 3 meetings
Actual: 3

CHAPTER THREE

AGRICULTURAL BIOTECHNOLOGY

The U.N.'s Food and Agriculture Organization (2001) reports that 45 percent of the world's soils suffer from low fertility, salinity, or acidity. Combining drought-tolerant varieties developed through biotechnology with improved water management and crop rotations are low-input, sustainable ways to raise yields and reduce post-harvest losses (estimated at 20 percent on a global basis and up to 50 percent in developing countries). Innovations such as genetically modified fruit and vegetables with delayed ripening traits can reduce transport and post-harvest losses significantly. Biotechnology is the most carefully examined crop improvement tool in the history of agricultural science. The massive adoption of agricultural biotech products in the United States, Argentina, and Canada has had benign or beneficial effects on the environment. Because of the breadth of its potential applications and the complexities of measuring its potential effects, however, agricultural biotechnology encountered fierce opposition.

The wide variety of potential applications of biotechnology in agriculture suggests that different types of biotech products call for different regulatory authorities. The first generation of agricultural biotech products—Bt and Roundup-Ready varieties and hybrids—reduces production costs and should logically fall under the authority of agricultural regulatory agencies like MAG-FOR. Public health agencies might regulate the second generation of products such as “golden rice” that provide enhanced taste and nutritional characteristics. These biotech rice varieties produce high levels of beta carotene, a precursor to vitamin A, which is deficient in the diets of an estimated 200 million children, causing 500,000 cases of blindness.

The third generation—plants producing pharmaceuticals and delivering vaccines—may have to be regulated by medical and public health experts. Bio-remediation products might be the responsibility of environmental protection agencies, and so on. Regulatory agencies such as MAG-FOR, MARENA, Ministry of Health, and MIFIC approach agricultural biotechnology from different perspectives and are concerned with different aspects of these new technologies. But as regulatory agencies, they need to develop effective means for evaluating biotech products prior to testing or commercial release, and they need to share technical information and learn to assess the potential effects of individual biotech products.

PROMESA's biotechnology program was not designed to promote any particular innovation or biotechnology in general, and resolving the debate over biotechnology was beyond its scope. Its purpose was, rather, to educate farmers, agribusiness, regulatory agencies, and consumers on the potential benefits and risks of biotechnology and inform the policy formation process. It began when the PVP law passed in 2000. PROMESA hired biotech and PVP experts from Argentina and Uruguay to assess Nicaragua's technical capability to evaluate environmental risk assessments and provided an assessment of the legal framework governing agricultural biotech products that will inevitably reach Nicaragua and apply for intellectual property rights protection. The results, which provided the basis for PROMESA's

biotech campaign, indicated adequate technical expertise but inadequate definition of regulatory procedures.

BIOTECHNOLOGY POLICY

MAG-FOR was keenly interested in agricultural biotechnology. Free trade agreements in 2004 and 2005 loom large on the policy horizon and, after the passage of the Ley de lo Contencioso Administrativo (similar to the Paperwork Reduction Act in the United States, requiring regulators to respond to applicants within 30 days), bureaucratic delays no longer provide cover from difficult regulatory decisions. PROMESA helped MAG-FOR develop a reorganization plan separating DGS from the Plant Health Department (DGPSA), raising DGS to its former status as a "dirección general" and establishing an Agricultural Biotechnology Department.

Companies with proprietary biotech seed products tend to be reluctant to launch them in new markets where appropriate regulatory frameworks do not exist. Nicaraguan regulatory institutions are still defining authority over biotechnology, and PROMESA helped MAG-FOR avoid inappropriate policies. PROMESA argued that until a commission with a broad mandate and authority to regulate all biotech products is eventually established, MAG-FOR should be responsible for the testing and commercial release of agricultural biotech products, exercising its authority in consultation with other relevant ministries represented in a National Biosafety Commission.

PROMESA helped MAG-FOR comply with the World Trade Organization, Codex Alimentaris, and free trade agreements; define regulatory procedures based on science-based risk assessments; and prevent short-term commercial and political considerations from interfering with environmental impact assessments. PROMESA's training and study tours and practical experience designing a seed accreditation system gave DGS the conceptual tools it needed to design a regulatory framework for agricultural biotech products.

PUBLIC EDUCATION ON BIOTECHNOLOGY

PROMESA launched a biotech information campaign to increase public awareness of agricultural biotech products. The general public read weekly newspaper articles and listened to broadcast media coverage. Agricultural technicians, policy makers, universities, and farmer organizations received information through seminars, workshops, and a twice-monthly bulletin called *Biotecnología*, providing information on innovative biotech research and markets for these new technologies. It also contained news highlights on the biotech industry and the international biotechnology debate. Its circulation gradually increased to 4,000 subscribers, plus Internet readers. *Biotecnología* informed the opinions of agricultural decision-makers. (PROMESA published a compendium edition of *Biotecnología* for universities, farmer organizations, seed companies, regulatory agencies, extension agents, and policy makers.)

Before PROMESA's education campaign, most of the information on biotechnology provided by mass media was based on sensationalist claims made by special interest groups. When PROMESA's campaign got under way, it encountered strong opposition from two local groups: Centro Humboldt and the Liga por la Defensa del Consumidor. They launched a campaign to frighten consumers and create a popular groundswell against a range of issues including biotechnology, hybrid seed, multinationals, and globalization. Their strategy lacked the credibility of PROMESA's science-based information in newspaper articles, seminars, workshops, and *Biotecnologia*.

Biotechnology opponents nevertheless convinced farmers in some areas that hybrid seed involves biotechnology, creates anomalies such as fish heads growing from corn plants, and poses serious health risks. Misinformation and scare tactics backfired, however, when these assertions were examined in the national press. Biotech opponents eventually abandoned the "Frankenfoods" strategy and responded with more sophisticated arguments. Changes in the terms and tone of the biotechnology debate paved the way for the establishment of a National Biosafety Commission to assess the potential risks and benefits of agricultural biotech products on a scientific, case-by-case basis.

The PROMESA task order prohibited the project from informing biotech companies about market opportunities in Nicaragua until a regulatory framework was established, PROMESA restricted its campaign to public information, technical training, and participation in professional conferences. Media coverage shifted to the elections in the second half of 2001 and to political power struggles in the first quarter of 2002. Biotechnology coverage dropped further when a particularly vocal opponent of biotechnology left Centro Humboldt. Few articles appeared in the national press in 2002 until a biotechnology conference at the Universidad Centroamericano (UCA) reignited the debate.

The 2002 UCA conference attracted researchers from Central America and the United States, including a poster presentation on alleged "biotech seed" found in markets in Managua, Leon, and Chinandega. Hoping to avoid a scandal based on misinformation, PROMESA published the UCA's results in *Biotecnologia*, explaining that the alleged "seed" was likely imported maize grain. Several weeks later, the Alianza por una Nicaragua Libre de Transgenicos, a newly formed lobby for environmental protection and consumer rights organizations, launched an anti-biotech media campaign targeting PROMESA's variety demonstrations, World Food Programme (WFP) food donations distributed by food-for-work programs, and MAG-FOR's Libra por Libra seed program.

The Alianza por una Nicaragua Libre de Transgenicos proposed a moratorium on biotech products, claiming that they pose health risks and threaten biodiversity. It charged Libra por Libra with trading "transgenic hybrid seed" for farm-saved seed of traditional varieties. It accused USAID of making farmers dependent on multinationals and refusing to engage in the biotech debate. It accused PROMESA of planting biotech seed in its maize demonstrations. It claimed that the WFP distributed biotech seed in its food-for-work programs, using Nicaraguans as guinea pigs to study the health risks of transgenic foods. The Alianza based its claims on samples allegedly drawn from WFP food donations and PROMESA variety demonstrations, which were then tested by Genetic-ID, a reputable U.S.

laboratory. The test results indicated the presence of genetically modified maize but did not identify the types of biotechnology or show whether the samples came from transgenic seed or imported grain.

The debate over biotechnology continues, but at a different level and tone, evidenced by a more balanced discussion of scientific and economic considerations in *La Prensa* and *El Nuevo Diario*. PROMESA's involvement of stakeholders at many levels in the debate helped pave the way for the establishment of a National Biosafety Commission. PROMESA's biotech campaign resulted in a MAG-FOR decree to change the regulations of the Plant and Animal Health Law, establishing a National Biosafety Commission to advise MAG-FOR on agricultural biotechnology and assess the potential environmental impact of individual products. The Biotechnology Commission will assess individual biotech products and advise MAG-FOR on testing and commercial release, but will have no decision-making or regulatory authority. The Secretaria Legal de la Presidencia approved the decree and submitted it to the President for his signature. A month after PROMESA ended, establishment of the National Biosafety Commission was still awaiting the President's signature.

Biotechnology Indicators

Figure 19: Circulation of Twice-Monthly Biotech Bulletins in 2001/2002

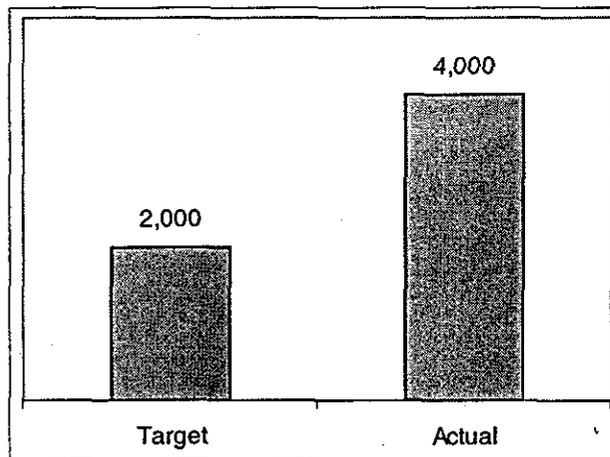
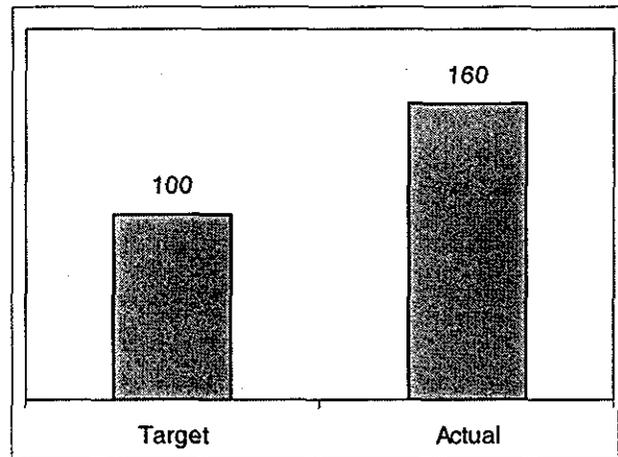


Figure 20: Number of Newspaper Articles on Biotechnology in 2001/2002



- Applications of agricultural biotech products identified (2.3-a). **(Completed: *Biotechnologia* and compendium.)**
- Biosafety Commission defines internal procedures and defines evaluation guidelines (2.2-a). **(Pending approval of Biosafety Commission.)**
- Biosafety Commission reviews biotech applications (2.4-a). **(Pending approval of Biosafety Commission.)**

- Biosafety Commission attends technical conferences (2.2-b). (**Completed: San Salvador [1999]; UCA [2002].**)
- Linkages established between public and private organizations involved in biotechnology (2.4-b). (**Completed: training and stakeholder debates.**)

INVESTMENT

Before investing in small foreign markets, seed companies weigh expected profits against the potential costs of regulatory barriers. To attract investment and new varieties, Nicaragua needs policies that lower the cost of introducing new varieties and that lower market barriers. It needs accreditation programs, seed promotion programs, and policies that strengthen linkages between public and private seed organizations. It also needs a credible system of intellectual property rights protection for proprietary seed products.

Maintaining ownership control over proprietary seed products is a necessary condition for foreign investment. A PVP law can increase competition in seed markets and accelerate technology transfer to small-scale farmers. is only one of the conditions needed to attract investors. It must be implemented by credible regulatory agencies with transparent procedures. PROMESA helped several foreign investors evaluate Nicaraguan seed markets and assess the feasibility of investments in distributors, contract seed production, and direct foreign investment (Table 4).

Table 4: Potential Foreign Investment in Nicaraguan Seed Industry

Hybrid seed	Central American company begins exporting seed to Nicaragua and investigates feasibility of producing seed in Nicaragua for export.
Seed plugs	U.S. and Central American flower and vegetable seed and plug companies assess feasibility of producing and marketing in Nicaragua.
Seed potatoes	Increased seed potato exports from the United States, Canada, and Central America, and prospects for seed production in Nicaragua.
Black bean seed	National grain marketing organization contracts Nicaraguan farmers to produce certified seed of improved black bean varieties.
Vegetable seed	U.S. seed company begins distributing vegetable seed through Nicaraguan farmer association.
Tobacco seed	European and Australian companies establish new tobacco seed distributors.
National marketing subsidiary	Major Central American seed company establishes a Nicaraguan subsidiary.

INAPPROPRIATE BIOTECH AND PVP POLICIES AVOIDED

PROMESA helped MAG-FOR define a policy framework for the seed industry that encourages market efficiency, transparency, and technology transfer, but several legislative initiatives threatened to reverse the progress. PROMESA provided technical and legal analysis, conducted seminars, proposed modifications to draft legislation, and briefed National Assembly committees, the Presidential Secretariat, and the Supreme Court.

PROMESA also provided assistance to MAG-FOR's legal team to avoid the inappropriate laws and regulations described below.

- **Biodiversity Law.** The 2000 PVP law provides intellectual property rights to breeders of new, distinct, and stable improved varieties. The draft biodiversity law would have provided intellectual property rights over unimproved varieties to indigenous communities, thereby reducing the incentives for plant breeding. The property rights of indigenous communities deserve special attention, but should not be confused with plant breeders' rights. As drafted, the law would have required environmental impact assessments and MARENA's approval for each new variety and hybrid entering Nicaragua. It would have given authority over new variety releases and phytosanitary regulations, currently the responsibility of MAG-FOR, to an institute to be established by, and work closely with, MARENA.
- **Penal Code.** The National Assembly reviewed proposed revisions in the Penal Code that would have redefined the intellectual property rights of plant breeders. PROMESA provided technical analysis to modify an article that would have provided intellectual property rights over unimproved native plants to indigenous groups. PROMESA assisted MAG-FOR and MINSA in redefining regulatory authority based on technical competency.
- **PVP Redefined.** Two constitutional challenges to the PVP law and several personal lawsuits were submitted to the Supreme Court, alleging that the UPOV-compliant PVP law is unconstitutional and that some of its public sector proponents acted irresponsibly. PROMESA and the U.S. Embassy sponsored meetings and lectures during 2001 and 2002 by biotechnology experts from the University of California at Davis and the University of Tuskegee, who met with journalists, members of the Supreme Court and the National Assembly, academics, ministers of MAG-FOR and MARENA, and the general public. These meetings provided opportunities for decision makers to meet informally to discuss the risks and benefits of agricultural biotech products.
- **Public Health Law.** PROMESA assisted MAG-FOR in evaluating proposed modifications in the Public Health Law. As drafted, the law would have provided MINSA with regulatory authority over all types of microorganisms, including pharmaceutical, industrial, and agricultural products, from brewer's yeast to environmental remediation products.

Policy Avoidance Indicator

Harmful legislative initiatives avoided (1.6-a).

Target: 4

Actual: 4 (Biodiversity, Penal Code, Public Health Law, and lawsuits against PVP)

CHAPTER FOUR LESSONS LEARNED

PROMESA was the result of a USAID strategy formulated in the mid-1990s that identified improved varieties as a catalyst for increasing farm production, income, and investment. USAID identified bean seed as an unmet need of small-scale farmers and a marketing opportunity for seed companies. DAI designed PROMESA to help seed companies market to small- and medium-scale farmers, improve their access to seed of improved varieties, increase production, and sell in commercial markets. PROMESA focused on increasing the demand for certified seed and expanding commercial seed distribution channels.

PROMESA's approach was clearly effective in increasing investment and demand for certified seed. The use of certified seed for all of the major basic grains increased, but the demand for maize, bean, and rice seed grew particularly fast (Figure 21). The demand for soybean and sesame seed fell as the areas planted in these crops declined, but rapidly expanding peanut production area raised the demand for certified seed for oilseed crops as a whole (Figure 22).

Nevertheless, the overall use of improved varieties remains alarmingly low, constraining agricultural production and economic development. Less than one-third of the production area is planted with improved varieties, and less than 20 percent is planted with certified seed. Future growth in the demand for certified seed will depend on market channel efficiency, GON/donor procurement practices, regulatory practices, and credit as well as uncontrollable factors such as world grain prices and natural disasters.

Figure 21: Certified Seed Used Basic Grains (quintals)

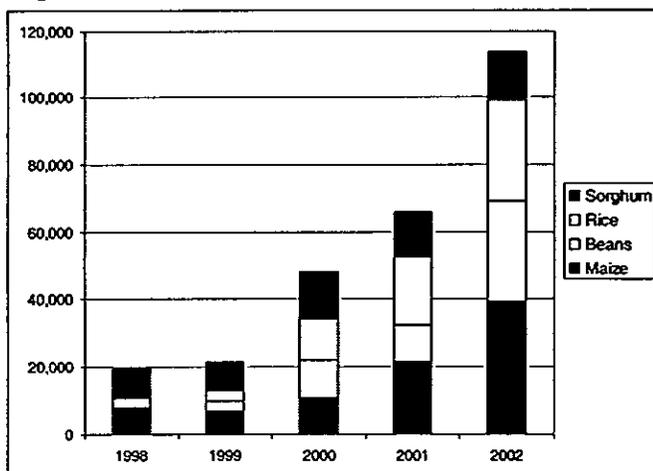
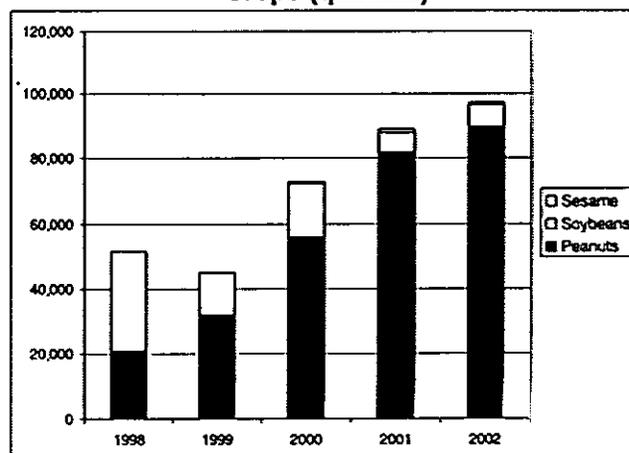


Figure 22: Certified Seed Used Oilseed Crops (quintals)



After Hurricane Mitch, USAID contracted DAI to expand PROMESA field activities, importing hybrid maize seed and contracting with small-scale farmers to produce seed of new improved varieties to replenish the national seed supply. During the next four years,

hundreds of farmers tested a wide range of varieties and hybrids in their own fields, thousands began producing certified seed, and tens of thousands planted it, contributing to a 30 percent increase in national grain production. PROMESA's training, advocacy, and field operations adapted to a series of unanticipated challenges: Hurricane Mitch relief efforts, public institutions, and bureaucratic delays during a presidential election year, a succession of MAG-FOR ministers, institutional turf battles and gridlock, and misinformation from special interest groups. The rest of this chapter describes some unexpected problems, achievements, and failures that may be useful for future agricultural development projects and particularly for agricultural technology transfer projects in Nicaragua.

GOVERNMENT RELATIONS

Problem 1: Institutional Amnesia Caused by Public Sector Turnover

Between 1998 and 2002, PROMESA worked with six different MAG-FOR administrations. Its relationships with some administrations—particularly the first and last—were effective. PROMESA's relationships with MAG-FOR and INTA at the technical levels remained strong throughout this period, thereby facilitating transitions from one administration to another.

One of PROMESA's partners after Hurricane Mitch was the Instituto Nacional de Tecnología Agrícola. Many INTA personnel were professionally trained and motivated to transfer technologies to farmers, but INTA's operations are widely dispersed and its resources inadequate to cover its mandates. The institute's crop research, seed production, and extension programs deteriorated during the late 1990s.

In 2001, PROMESA hired a former INTA director to provide technical assistance to INTA's maize program. He improved coordination and got INTA involved in designing PTA's National Seed Plan. Coordination between MAG-FOR and INTA gradually improved, and long-term commitments grew increasingly reliable, particularly after the presidential elections in 2001.

Lesson 1: Relationships between projects and public sector counterparts are tricky and hazardous, but they are important for technology transfer. Professional ties between technical personnel can provide the basis for cooperation when political support is unreliable.

Problem 2: Resistance to Regulatory Innovations

PROMESA addressed regulatory obstacles by providing technical and legal analysis and by conducting workshops where public and private sector technicians discussed regulatory standards and procedures. These workshops introduced new technical information and marketing concepts. Workshops also provided opportunities for field technicians, using

technical criteria, to design regulatory innovations. Involving as many stakeholders as possible in these workshops resulted in concrete conclusions, specific recommendations, and improved communication between institutions. Study tours and trade missions also were effective in providing insights into policy issues and fostering coordination between regulatory agencies and the private sector.

Lesson 2: Technical workshops and training events where professionals exchange information informally can lay the technical groundwork for future policy decisions.

Problem 3: Vested Interests of Some GON/Donor Programs in Bypassing Commercial Channels and Providing Benefits Directly to Farmers

Some GON/donor programs distributed seed directly to farmers, serving as gatekeepers of improved varieties. Others were more market oriented. For example, MAG-FOR's Delegaciones Territoriales, previously responsible for PNAPP in 1999 and 2000 and currently managing Libra por Libra, changed its seed procurement policies to foster private seed market channels. The difference between Libra por Libra and previous programs like PNAPP is that instead of GON agencies donating or selling seed on credit, seed companies supply rural retailers who compete to sell seed to small-scale farmers.

Between 1998 and 2002, INTA reassessed its comparative advantages and focused on supplying parent seed to seed companies. According to the National Seed Plan, PTA will provide INTA with a seed procurement fund for parent seed.

Lesson 3: Consider stakeholder incentives to bypass commercial channels.

Problem 4: Agricultural Experts Resisting New Production Technologies

PROMESA was surprised to encounter agricultural technicians opposed the introduction of new varieties and hybrids, because of paternalism toward small-scale farmers, distrust of private companies, institutional rivalries, or opportunistic seed procurement practices.

PROMESA hired scientists and extension experts to conduct seminars, workshops, and extensive field work to train donor field technicians. This four-year investment in technical education involved dozens of formal training events, hundreds of field days, and thousands of one-on-one training sessions. Growth in national seed demand indicates increased farmer adoption of improved varieties.

Lesson 4: Technical information from highly credible sources can change technicians' attitudes toward new technologies. Nevertheless, it may be difficult to measure technology adoption rates in the short term.

EXTENSION AND EDUCATION

Problem 5: Seed Company Reliance on GON/Donor Seed Markets

GON/donor programs play important roles in the national seed market, but they have a mixed impact on market efficiency. Competition tends to be weak in GON/donor seed markets, where a few large suppliers compete for a few large procurements. The average size of GON and donor seed procurements tends to be large and transaction costs are low, but their demand for seed is unreliable and ultimately unsustainable, tending to “crowd out” direct sales to farmers. In markets where seed companies sell to individual farmers, competition motivates suppliers to provide technical support and information.

Remnants of paternalism toward small-scale farmers, suspicion of multinationals, and a bias toward government-funded programs still exist even among Nicaragua’s new generation of policy makers, many of whom were educated in the United States. When PROMESA began, seed importers used private channels to sell to large-scale farmers whereas INTA tested new varieties and distributed seed to small-scale farmers. INTA also taught artisanal methods for producing non-certified seed, thereby “protecting farmers from multinationals. INTA produces high-quality parent seed for seed companies, but the quality of its non-certified artisanal seed is unreliable. By selling non-certified seed at artificially low, GON-subsidized prices, INTA competes unfairly with national seed companies and undermines farmers’ confidence in the quality of certified seed.

Lesson 5: GON/donor programs can extend commercial seed market channels.

Problem 6: Special Interest Groups Using Misinformation

PROMESA’s campaign to educate agricultural technicians and the general public about agricultural biotechnology began under USAID’s Hurricane Mitch supplemental program and continued under PROMESA’s subsequent task order. In April 2002, UCA sparked public debate by publishing the results of a market survey indicating that biotech seed was common in Nicaragua’s food system. Overnight, biotechnology became a hot topic in the press, and USAID and the U.S. Embassy devoted considerable effort in responding to misleading information about biotechnology and unfounded allegations made by extremist environmental groups against USAID, the U.S. Embassy, WFP, and PROMESA. Were it not for the prudent and consistent responses of USAID and the U.S. Embassy, and PROMESA’s steady flow of science-based information in newspaper articles, radio and television debates, and *Biotecnologia*, the scare tactics of Centro Humboldt and the Liga en Defensa del Consumidor might have been successful.

Lesson 6: Biotechnology is likely to provide the basis for the next “green revolution” in agriculture, but the forces against it are formidable and persistent. Special interest groups using inaccurate information to sway public opinion can be stopped by science-based public relations campaigns. Unchallenged, however, they can resort to scare tactics.

POST-HARVEST OPERATIONS AND MARKETING

Problem 7: High Cost of Credit for Post-Harvest Operations

The high cost of credit for post-harvest seed operations continues to constrain seed sector development. PROMESA used proceeds from seed sales to relief programs in the wake of Hurricane Mitch to establish a reflow fund for certified seed, playing an integral role in expanding national seed markets by helping new seed producer organizations develop into reliable suppliers of certified seed. Reflows provided operating capital to seed companies for seed inventory, stabilized market conditions and protected seed companies from short-term demand fluctuations, thereby stabilizing the seed supply and allowing seed companies to respond to long-term growth trends.

Lesson 7: Targeted liquidity (credit and grants) can capitalize key stages in farm-to-market channels, relieving constraints and rejuvenating agribusiness industries.

Problem 8: Bumper Harvests and Falling Farmgate Prices

To date, the Libra por Libra Program has had mixed results. The use of certified seed increased rapidly. Seed companies and importers forged new alliances to market seed through more than 600 rural retailers. On the other hand, Libra por Libra crowded out donor seed procurement, just as donor procurement crowds out direct sales to farmers. Libra por Libra was a major factor in the bumper maize harvest in Primera 2002, allowing Nicaragua to return at least temporarily to its former status as “the granary of Central America”; a fall in maize prices could, however, reduce total farm income.

Lesson 8: Transferring production technologies requires a clear understanding of farm-to-market channels.

Problem 9: Outgrower Trickle-Down Programs for Small-scale Farmers

A conventional approach to developing non-traditional agricultural exports involves helping large-scale farmers establish export market channels and encouraging them to use small-scale farmers as outgrowers, who gradually gain enough experience to market their own production in export channels, increasing competition and efficiency. PROMESA’s approach to non-traditional agricultural export development was to send trade missions to meet foreign buyers. It hired some of the country’s best extension experts to work in the field with farmers to meet export standards. Nicaraguan seed companies began exporting certified bean seed (black beans and broom sorghum fiber.) Black bean exports grew from negligible levels in 1999 to 300,000 quintals in 2002. More than 100 manzanas of broom sorghum production is destined for assembly plants in Honduras, which re-export finished products to U.S. and European markets.

Lesson 9: Events where small farmer groups meet informally with traders can provide access to export markets for low-tech, high-value farm products to complement outgrower programs and stimulate non-traditional agricultural exports.

Problem 10: Impact of Grain Prices on Seed Demand

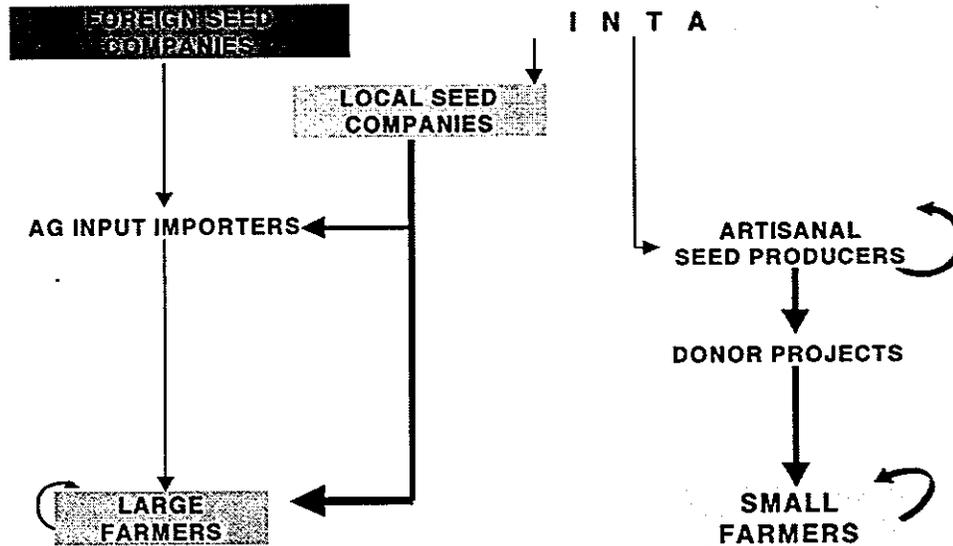
Grain prices have a major impact on seed demand. When grain prices rise, farmers invest in production inputs such as certified seed. When grain prices fall, some switch to farm-saved seed. For example, the demand for rice seed was severely depressed when PROMESA began in 1998, and modern, mechanized rice farmers were planting low-quality, farm-saved seed. After ANAR negotiated a rice import tax in 2001, the demand for high-quality rice seed soared. Another example of how grain prices affect seed demand was when world soybean prices fell in 1999 and the demand for soybean seed virtually disappeared. The relationship between grain prices and seed demand has important implications on seed advertising and promotion programs.

Lesson 10: Projects can accelerate technology transfer by helping farmers and agribusinesses understand and manage market channels.

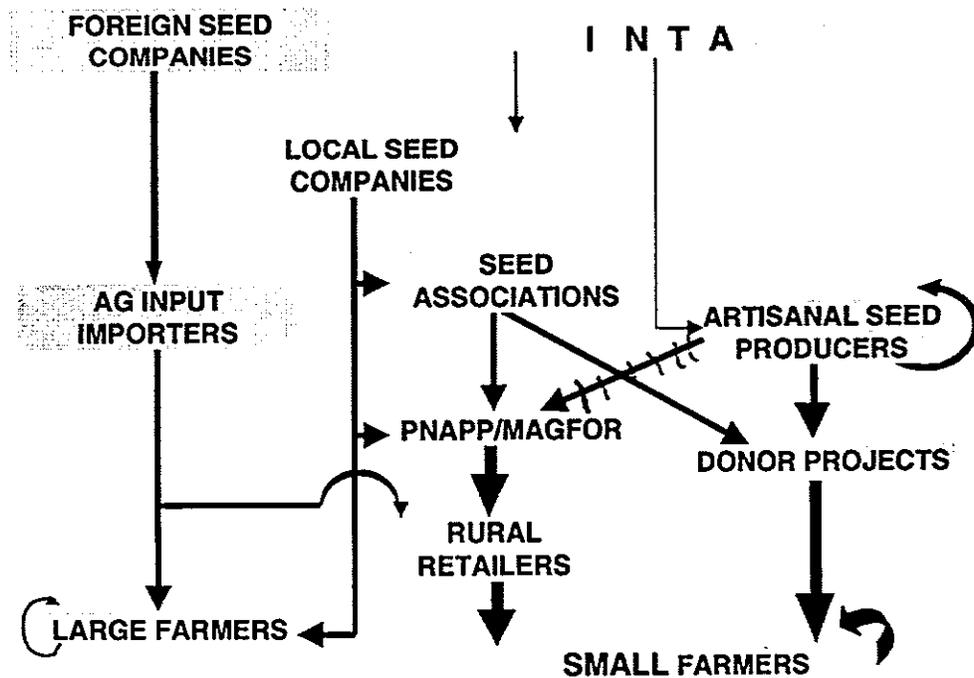
ANNEX A
NATIONAL SEED SYSTEM SCHEMATICS

NATIONAL SEED SYSTEM BASIC GRAINS AND OILSEED CROPS

1997



NATIONAL SEED SYSTEM BASIC GRAINS AND OILSEED CROPS 2002



NATIONAL SEED SYSTEM BASIC GRAINS AND OILSEED CROPS FUTURE

