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INVIGORATING THE SEED INDUSTRY IN EL SALVADOR

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INVIGORATING THE SEED INDUSTRY IN EL SALVADOR

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SECTION I

INTRODUCTION

Background

After more than a decade of decline, the Salvadoran economy, and especially the agricultural sector, is responding favorably to numerous macro-policy, sectoral, structural, and trade related adjustments which were initiated in June 1989 and continue at present.

As the agricultural sector returns to positive growth rates, demand for agricultural inputs is expected to increase, and accordingly, policies, regulations, and institutions related to key sub-sectors must be adjusted in order to achieve the most supportive and facilitating environment possible.

While all agricultural inputs and practices have the potential for contributing to increases in productivity and, therefore output, seeds are perhaps the most important. Seeds not only sustain the means for reproduction but also the potential to store and multiply genetic and physical alterations which can lead to higher yields, improved resistance to pests, tolerance to extreme conditions, and adaptations to different agro-ecological zones.

In the late 1950's, El Salvador was the first Central American country which established productive research and development foundations which subsequently introduced the first successful white hybrid corn in the region in the early 1960's. Identified as H3 and H5, these two hybrids were soon popular throughout Central America, and seed exports soon accounted for a large portion of the seed industry output. Supportive legislation was achieved in 1971 with Decree No.259 which sanctioned the Certification Law for Seeds and Plants. In 1979, the Ministry of Agriculture (MAG) approved and published in the Diario Official the Regulations for the Production and Commercialization of Certified Corn Seeds. During the 1970's, improved white sorghum, and during the 1980's, rice and beans were added to the research and development program.

The impact on grain production was soon felt with yields increasing soon after the introduction of hybrids or improved varieties. Corn yields more than doubled from 14 qq/Mz in 1961/62 to 30 qq/Mz in 1973/74 as farmers switched from national or "criollo" corn varieties to the new hybrids. Since then, yields stabilized and have managed to increase slightly to an average of 36 qq/Mz. Since the introduction of improved sorghum varieties in the late 1970's, average yields have risen from 14 to 19 qq/Mz in 1989/90. Improved rice varieties have had the greatest impact contributing to doubling yields from 30 qq/Mz in 1961/62, to 62 qq/Mz in 1989/90. Contrary to basic grains, beans have not shown a significant increase in yields, despite introductions of several improved varieties.[1]

Paralleling these developments, certified corn seed production, assisted significantly by export demand continued to increase until 1983/84, when a peak

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[1] See Appendix 1 for grain production statistics.

of 80,000 qq of seed corn was produced. Production of certified rice and sorghum seeds peaked in 1986/87 when a total of 14,500 qq and 5,400 qq were produced, respectively. Since then the industry has experienced a free fall with certified seed production declining to 42,000 qq of corn, 11,000 qq of rice, and 2,700 qq of sorghum.

Terms of Reference

The decline of the certified seed industry since the early 1980's is of great concern to the Government of El Salvador (GOES) and the industry itself. The trends are not only negative but threaten to stymie the positive impacts achieved, so far in the agricultural sector, especially in the basic grains sub-sector.

The team was charged to undertake an appraisal of the seed industry to: (1) verify the reasons for its spectacular growth, (2) identify the reasons for its equally spectacular decline, and (3) suggest a programmatic approach to achieve a successful reactivation of this vital industry.[2]

Acknowledgements

The team arrived in El Salvador on August 25 and departed on October 5, 1991. During this time the team worked with many individuals and institutions, both in the private and public sector.[3] The team wishes to thank them all for their support, collaboration, arguments, and criticism. It is the sincere hope of the authors that this small effort will contribute to a successful reactivation of the seed industry in El Salvador.

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[2] See Appendix 2 for complete terms of reference.

[3] See Appendix 3 for contacts.

SECTION II

APPRAISAL OF THE SEED INDUSTRY

The Demand for Agricultural Inputs[1]

The demand for an agricultural input such as certified seed, is a derived demand which depends on the value that such input contributes to the production of the commodity. This demand is ascertained by establishing both the physical and the economic relationships between the input and the output. The physical relationships are given by the Marginal Physical Product (MPP) and the Total Physical Product (TPP) that can be obtained from the use of a resource (X_1). As the name implies, the MPP establishes the additional physical level of the input's contribution to production, that is the amount added to total production when another unit of the variable input is used. TPP is the production function. It shows the total physical level of production for a given resource.

For example, if 25 lbs of certified white corn seed per Mz produces 30 qq of commercial corn, the seed has a TPP of 30 at that level of use, ceteris paribus. If a seeding rate of 30 lbs per Mz produces a TPP of 35 qq of white corn, the TPP is 17% higher than the first seeding rate, and the MPP is 1.00 qq of white corn produced for the additional units of seed used.[2] The higher the MPP, the more valuable the input is to production, ceteris paribus.

The question now is, whether this marginal productivity is worth the cost, i.e., is the MPP worth the extra expenditure in seed? In order to answer this question, and beyond, in order to optimize this technical (input-output) relationship, monetary values are added to the physical values, and the optimum economic level of resource use (demand) is thus determined.

First, the TPP is multiplied by the price of the product (say, farm gate price for white corn) to obtain the Total Value Product (TVP), that is value of production (total revenue). Second, the monetary value of the MPP of the variable input is given by its Marginal Value Product (MVP), and is derived by multiplying the MPP by the price of the output. The MVP tells us how much additional value of output (revenue) is produced by each additional amount of X_1 used. The third and final monetary value that is needed is the cost of the input. This is given by its Marginal Factor Cost (MFC) which measures the amount that is added to total cost when one more unit of the variable input is used. Since the market price for the input is the same per unit, using another unit of that input will add just the purchase price to total cost. Therefore, to maximize profit, use the amount of input where $MFC_{X1} = MVP_{X1}$.

In a competitive market, an optimum point of production is determined by locating the point on the production function where one more unit of the variable input

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[1] This section is taken directly from "Agricultural Economics and Agribusiness", Chapter 4, by Gail L. Cramer and Clarance W. Jensen.

[2] MPP = 35-30/30-25.

adds to the revenue (TVP) just what it adds to costs (MFC), that is, where MVP = MFC. Before that point the enterprise would be forgoing additional revenues, and beyond that point it would be decreasing its revenues.

This producer decision making concept of finding the optimum level of use for a variable input (such as seed) and thus its demand, is summarized in Table 1 and Figure 1.

Given the physical relationship (input/output) between the resource (say, certified white corn seed) and production (white corn), and the monetary relationship between cost of the input (certified seed) and the value of production (potential revenue from selling white corn at the farm gate), then the optimum production point and use of the input is at approximately 60 units of input. This is the point that would give us a TVP of 710 and equality between MVP and MFC, ceteris paribus. If nothing were to change this would be the demand for the input as well.

Why this is the optimum production point and use of input X_1 (and therefore demand) can be ascertained from the following exercise. If we were to use 70 X_1 instead, our marginal value product per unit for the additional 10 units of X_1 would be $4.30. However, since each unit costs $5.00 we would be losing $0.70 on each of them, a loss we can avoid by reducing the input use back to 60. On the other hand, if we use only 50 units of X_1, the last 10 units of that resource added $6.20 each to the MVP, which is $1.20 more than they cost, meaning that total revenue can be increased by using more X_1.

The same conclusion can be reached from the revenue side. The highest total net return to the enterprise is achieved at 60 units of input for a net revenue of $410. Any other level of use of input X_1, ceteris paribus, will result in lower net revenues for the enterprise. This is summarized below.

Variable Input (X_1)	Total Revenue (TR)	Total Cost of X_1 (TC_{X1})	Net Revenue ($TR-TC_{X1}$)
.	.	.	.
.	.	.	.
50	$648	$250	$398
60	710	300	410
70	753	350	403
.	.	.	.
.	.	.	.

Source: Agricultural Economics and Agribusiness, by Gail L. Cramer and Clarance W. Jensen, pp. 72-90.

The assumption of ceteris paribus about input and output prices, as well as the technical (physical) relationship between the inputs and the output is valid only in the briefest period of time. Average farm gate and input prices change at least from season to season, and the technical relationships which determine the physical production function change over the years, due to improved management practices. In a market setting, changing economic conditions cause frequent

price adjustments in both resource (seed) and product markets (white corn). So the optimum is correct, not for all time, but only until another price change occurs (input or output), then an adjustment in X_1 use must be again be made to find a new optimum. These shifts in input and product prices, linked through their physical relationship, then establishes the demand curve for the input.

This relationship is presented in Figure 2, where a hypothetical demand curve for input X_1 has been drawn (curve DD). The optimal use at the moment is at point A, were demand for the input is at 60 units of X_1, and at a MFC of $5.00 per unit. This demand level can be altered two ways, namely by a shift along the current demand curve (change in quantity demanded) or by a shift of the demand curve itself (change in demand).

For example, as the price of a variable input (certified seed) falls, it would appear logical that greater amounts of that input would be used to increase the quantity of product produced. In this case quantity demanded increases along the demand curve DD, say to point B, if the MFC drops to $2. An increase in the price of the input should cause a reduction in the rate of resource use. In this case, quantity demanded decreases along the demand curve DD, say to point C, if the MFC increases to $10. These changes in demand are known as shifts along the demand curve, and reflect the changing relationships between cost and value of an additional (marginal) unit of variable resource, ceteris paribus.

Demand for certified seeds can also be shifted due to a change in the output price (farm gate price of white corn, say P_{y1}) and/or changes in the MPP of X_1 due to use of other inputs. A change in either P_{y1} and/or MPP will change the MVP of X_1, and therefore the position of the demand curve itself (MVP = MPP*Price of output).

For example, an increase in seed demand, that is a shift of DD to the right, away from the origin in Figure 2 would come about, say as the price of corn increases, or if productivity of X_1 (yield) increases due to better application of fertilizers, chemicals, or improved farming practices (say, soil conservation which improves moisture retention in the soil), ceteris paribus. Conversely, total demand for X_1 could shrink and the demand curve DD could shift to the left, that is towards the origin, if the price for the output falls or the productivity of X_1 is reduced.

A more complicated scenario occurs when both the price of the input (P_{x1}) and the price of the output (P_{y1}) are affected simultaneously by externalities, ceteris paribus. Let us assume that inflation increases the nominal farm gate price of the output, say by 50%. If nothing else changes, then we could expect the demand curve for X_1 to shift to the right to D'D', and demand to settle say at A', or approximately 70 units of input. However, if inflation also affected the price of X_1 as well, then quantity demanded would decrease along the new demand curve D'D'. If the inflation rate affected P_{x1} in the same proportion as P_{y1}, the demand would settle back along D'D' to A'', leaving everything as it was.

Because inflation is only one of many externalities that can and do affect the MFC of an input and the price of the output, the impacts are highly unlikely to be proportional. Furthermore, there is also the issue of shifts to producing other crops, when their relative relationships to say white corn are altered by

the externalities. Finally, "ceteris paribus" does not occur in the real world, since the changes in the elements of the equation MVP_{x1} = MPP*Price of output are due themselves to simultaneous changes in other factors. Imagine taking the inflation example and adding to it a concurrent positive change in productivity, that is MPP - where to and by how much would demand for X_1 shift?

In summary, the input demand function is derived from three main factors which together determine the net return a farmer can expect from producing a given commodity. These factors are his production costs in this case price of certified seed (P_{X1}), his yield (MPP_{X1}) and value (MVP_{X1}) per unit of input, and the farm gate prices received (P_{Y1}), in this case farm gate price for basic grains and beans. When one or more of these changes, amount of the input used should also change.

These three factors are in turn affected by many externalities over which farmers have no control but to which they react, nevertheless in an attempt to increase their personal economic and social welfare. These externalities include the socio/political/economic setting, macro-economic as well as sectoral policies, policy strategies and instruments, and market conditions that, together create (1) positive, (2) counterbalancing, or (3) negative trends which will ultimately influence farmers' decisions on what and how much to cultivate of a range of commodities. This they do by adjusting their production patterns and reoptimizing their production decisions. These actions lead to corresponding changes in use of production inputs.

The Growth and Decline of the Seed Industry[3]

Given this framework, Section II reviews the growth and decline of the seed industry in El Salvador. The externalities which, in the opinion of the authors contributed to such rise and decline are analyzed. In some instances, due to lack of historical and reliable current information, some degree of intuitive and deductive reasoning is used in the analysis.

Production Trends of Certified Seeds. The certified seed industry in El Salvador has its beginning in the early 1960's, when the first certified hybrid corn varieties (H3 and H5) were released by CENTA (Centro de Tecnología Agrícola), to be produced and marketed. In the late 1970's, improved varieties of sorghum were introduced. The first improved varieties of rice and beans were released in the early 1980's. Since the beginning, both CENTA and private seed producers have been engaged in the production and marketing of improved and certified seeds.

Certified corn seed production and utilization continued to grow through the 1960's and 1970's. A peak production of 79,900 qq was reached during the crop year of 1982/83, shortly after the on-set of the agrarian reform in 1980. Since then it declined sharply, leveling off at 42,200 qq in 1988/89, and registering a negligible recovery to 43,600 qq by 1990/91.

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[3] Seed Industry is understood to include private institutions engaged in producing and selling certified and improved seeds, and public institutions engaged in regulating the industry, undertaking research, and producing foundation, basic, registered, and certified seed.

Certified seed production of both rice and sorghum began in the early 1980's, when 600 qq of rice seed and 700 qq of sorghum[4] seed were produced. Both peaked in 1986/87, when 14,500 qq and 5,400 qq of rice and sorghum seeds were produced. Like corn, both have since declined and leveled off at 11,000 qq and 2,700 qq, respectively.

Conditions Contributing to Seed Industry Growth. The introduction of improved and hybrid seeds in EL Salvador took place during a period of time when the country experienced unprecedented economic growth, low annual inflation and increasing consumer purchase power; when new sources for credit and ways and means were implemented to channel such credit to small and medium farmers; when an effective extension service had basic grains production as its first priority; and when a market existed which extended beyond the national borders. These favorable conditions are summarized below.

Economic Growth and Stability[5]

Perhaps the most important reason for the spectacular growth of the commercial seed industry in El Salvador is found in the overall economic performance of the country and the region in general between 1950 and 1978. During this 30 year period, the economy of EL Salvador grew at an average annual rate of 5%. This average rate was even higher during the 1960's when the newly created Central American Common Market had its debut and brief history, ending in 1969, when war broke out between EL Salvador and Honduras. Growth resumed in the early 1970's with the conclusion of bilateral trade agreements with other Central American Countries.

Economic growth during this period was spearheaded by investment, as gross fixed capital formation rose steadily, in relation to GDP, from 10.5% in the fifties to 13% in the sixties and to nearly 20% in the 1970-78 period. The impressive growth performance, exceeding the rate of population growth by some 2% on average, was associated with remarkable price stability during most of this period.

During the two decades prior to the oil price increase of 1973, the rate of domestic inflation (consumer prices) averaged only about 1% per year, but accelerated to an average of 10% during 1974-78. This combination of high economic growth and low inflation lead to substantial increases in real income during the 30 year period.

It is under these favorable macro-economic and market conditions that hybrid certified seeds for corn were introduced in El Salvador, and found a fertile ground. Agriculture, being the backbone of the economy was in a position to benefit from this development. The sector accounted for over 25% of real GDP, some 40% of the labor force, and about 2/3 of the total value of exports.

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[4] White sorghum for human and animal consumption, and forage.

[5] Taken directly from "Evaluation of AID Agrarian Reform Credit Project in El Salvador", Chechi and Company, page 8 and 9, September 1985.

Effective Extension Service[6]

During the 20 year time period between 1960 and 1979 the extension service played an instrumental role in the introduction, dissemination, and acceptance of hybrid corn throughout the country. The system as organized and executed was critical to the early success of the hybrid seed industry in the country. A brief summary of this successful program and its activities follow.

Technology transfer, that is extension to the small and medium size farmers was the sole responsibility of the Agricultural Extension Division of CENTA.

The objectives of the Division were:

- to train small and medium size producers in new technology generated by the research program;
- to integrate the activities of extension with those of research and seed technology to achieve the highest possible efficiency in the transfer of technology;
- train rural housewives in the basic concepts of efficient management of a rural household; and
- to guide and train rural youth in agricultural techniques and home economics.

In order to achieve these objectives, the Division organized its activities under six major programs, namely (1) basic grains, (2) fruits and vegetables, (3) sugar cane, (4) cotton, (5) home economics, and (6) rural youth. These programs were managed through 70 extension agencies distributed throughout the nation. In 1978, a total of 124 extension agents were assigned to the first two programs alone.

The basic grains program had two major objectives, namely:

- provide technical assistance in order to increase national grain production and decrease import requirements, and
- train producers in improved farming techniques and promote the use of improved seeds in order to achieve higher production yields.

One program activity which was instrumental in convincing farmers of the benefits associated with switching to improved and hybrid corn varieties was the use of demonstration plots. This activity was started in 1965, and was instrumental in the introduction and acceptance of the first hybrid corn (H3) between 1965 and 1968. In 1978, a total of 1,340 demonstration plots were being used throughout the country. Under this system the Extension Division provided assistance to 36,500 farmers who cultivated 58,000 Mz of basic grains during the crop year 1976-77.

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[6] This material taken directly from "Diagnóstico de la Situación de Semillas de los Granos Básicos para la República de El Salvador", by Dr. Ronald Echandi Z., CIGRAS/ACR, and Ing. Hernán González IICA, 1978.

CENTA also collaborated with other Government institutions such as the Banco de Fomento Agropecuario (BFA), the Instituto Salvadoreño de Transformación Agraria (ISTA), the Programa de la Presidencia de la República encargado del Fomento de la Acción Comunal (FOCCO), and the Instituto Salvadoreño de Fomento Agropecuario (INSA-FOCOOP). During the 1977-78 crop year, a total of 8,000 farmers, organized in 1,200 groups benefitted from CENTA's seed technology transfer program.

Agricultural Credit

Agricultural credit (which is itself a derived demand) played a crucial role in the growth of the seed industry. The favorable economic, structural, and market conditions created favorable financial terms under which farmers could borrow and repay their loans. Thus, demand for certified and improved seeds grew as farmers benefitted from a growing national economy, the effectiveness of supportive services such as extension, and an expanding export market for seed.

Figure 4 summarizes the total area of basic grains financed by BFA for the period 1963/64 through 1990/91. Area financed by BFA grew very slow during the 1960's, and exploded during the 1970's, reaching a peak during the 1979/80 crop year, when 150,436 Mz of corn, 64,266 Mz of sorghum, 32,153 Mz of beans, and 17,144 Mz of rice were financed. As shown in Figure 4, these areas represent significant amounts when reviewed as a percentage of total area cultivated.[7] At the onset of the agrarian reform BFA production credit financed nearly 80% of the area cultivated with rice, 50% in beans, and nearly 40% in corn and sorghum.

To a degree, the method of providing credit also contributed to the demand of certified and improved seeds. Under the system of "credit in kind" BFA issued "Ordenes de Retiro para Insumos" which allowed farmers to obtain agricultural inputs (seed, fertilizer, chemicals, tools) from independent agroservicios, and later (mid 1980's onward) from its own retail outlets.[8] To the degree that seed was linked to other inputs, this may have "pushed" seed demand. However, in the opinion of the authors this link was not the key variable that succeeded in "obligating" farmers to use certified and improved seeds.

Export Markets

Since the first certified corn hybrids (H3 and H5) were introduced, exports to neighboring countries played an apparent important role, at least through the mid 1980's. Since no official export statistics exist in regard to the annual volumes exported, the true magnitude and relevance of this market will never be known. Nevertheless, information obtained from several agroservicios, seed producers and a few reports indicate that this export market contributed considerably to the total demand for certified seed. According to these sources

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[7] Since BFA accounts for over 75% of the loans issued for basic grains production, the figures are representative of total industry behavior.

[8] As of crop year 1991/92, BFA no longer provides credit in kind, and will close all its retail outlets. Credit to farmers will be provided in the form of cash advances.

exports to Costa Rica, Guatemala, Honduras, and Nicaragua may have ranged between 30 and 50% of the volume of seed marketed.

This sizeable export component provided the seed industry with several key advantages, such as economies of scale in seed production, foreign exchange earnings, and recapitalization of profits.

Conditions Contributing to Seed Industry Decline. The favorable environment which was instrumental in the growth of the seed industry in El Salvador came to an abrupt halt at the end of the 1970's. In 1979, GDP declined 1.5%, and between 1979 and 1983 it declined 22%, with an anemic recovery registered in 1984. Between 1983 and 1988, GDP grew only 1.5% in real terms. Thus, during the 1980's, GDP had mostly negative growth annual rates which by 1988 had reduced GDP to 13% below the level of 1979. On a per capita basis this GDP reduction reflected a 24% decrease. Inflation accelerated to unprecedented levels pushing consumer prices to increase by 90% over the same time period; salaries, however increased at a much slower rate, leading to an erosion in consumer purchase power; the agrarian reform, started in 1980, had an immediate and negative effect on agricultural production; capital markets were weakened when private capital sought safer heavens in other countries; and an increasingly overvalued exchanged rate penalized agricultural production in the country. A more detailed review of some of the most salient points is provided below.

Macro Prices

Inflation[9]. Inflation is perhaps the most important contributing factor to the decline in demand for certified and improved seeds. Its adverse impact on seed demand as well as other agricultural production inputs can be inferred through the generated "real" impact of inflation on factors affecting a farmer's return. Table 3 contains the percentage change in the inflation rate by year since 1978. The inflation rate was over 15% in the late 1970's, it ranged between 12 and 15% during the early 1980's and accelerated to 32% per year by the end of 1986. Since then it has gradually declined yearly to 19.4% in 1990.

The effects of these inflation trends on basic grain production, and therefore on demand for agricultural inputs, including seeds are summarized below.

Decline in real producer prices for basic grains and beans.[10] With the exception of rice, nominal farm gate prices for basic grains and beans have more than doubled since 1978 (see upper portion of Table 4). For example, nominal corn prices increased from 19.39 C/qq to 40.33 C/qq between 1978 and 1987. However, the inflation rates during the same period of time have not only eroded such gains but, adding insult to injury have cut real farm gate prices and, therefore, incomes for these producers by substantial amounts. When these nominal prices are deflated, the real farm gate prices in 1987, for corn had declined to 47%

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[9] Robert A Nathan, page 71, updated.

[10] Robert A. Nathan, page 73, updated.

of their level in 1978, beans to 40%, rice to 20% and sorghum to 40% (see lower portion of Table 4).

Under these circumstances the incentives to produce large marketable surpluses of basic grains and beans above and beyond direct farm needs were greatly reduced. This disincentive translated into an incentive to reduce production costs, especially those that must be purchased and for which farmers themselves can readily substitute, seed being a good example.

Lower real input prices.[11] The first disincentive brought about by inflation on the revenue side is compounded by its simultaneous impact on the cost side faced by farmers. The high annual inflation rate also increased nominal production costs such as inputs, labor, and services (see first two columns of Tables 5 and 6). With the exception of input costs for sorghum the total real agricultural production cost for grains and beans decreased less than the real farm gate prices received by producers for their commodities (see last three columns in Tables 5 and 6).

For example, in real terms, the input costs for corn in 1987 were only 67% of their levels a decade ago. However, real farm gate price for corn was only 47% of its level in 1978, or fully 20% less than the real cost of inputs (Nathan, page 73).

Rice farmers suffered one of the biggest declines in income during this time period (Nathan, page 77). By 1986 farm gate price for rice reached only 20% of the level attained in 1978. On the other hand, production costs declined only to 52% of their level in 1978, while input costs increased in real terms 6% over their 1978 levels. Similar dismal comparisons can be made for the beans and sorghum.

Under these circumstances grain farmers' gross margins were squeezed, both from the revenue and the cost side simultaneously. As real farm gate prices for grains and beans declined and the real cost for input and production declined less rapidly than product prices (and in some cases increased, such as in rice and sorghum), farmers were forced to adjust the use of production inputs accordingly. Thus, farmers reduced the use of credit, the purchase of seeds, and possibly other inputs and services as well.

Negative real rates of interest.[12] Until 1989, the Banco de Fomento Agropecuario (BFA) charged farmers a rate of interest which was below the inflation rate. For example, in 1988, BFA was charging 13% versus and inflation rate of 20%. Thus, instead of paying a real rate of interest of say 8% (20+8), farmers were paying -7% (20-13), which represented an implicit subsidy of 15% by the bank.

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[11] Robert A. Nathan, page 73, updated.

[12] Robert A. Nathan, page 71-72.

Negative interest rates, not only misallocate the use of credit funds in general but tend to create an incentive for borrowers to postpone repayment of their credit obligations as long as possible, since eventually they will pay it back with cheaper Colones. This behavior reduces the level of funds available for credit during the following crop cycles. As a result, banks become more and more reluctant to issue new credit since their uncollected balances reach disproportionate levels, and additional funds must be channeled to refinancing outstanding credit obligations from previous years.

While this implicit subsidy (negative interest rates) might have dampened the effects of inflation on farmers' incomes it was not enough to offset them, thus discouraging grain producers from taking on further credit obligations. Furthermore, the incentive by borrowers to postpone credit repayment and the reduced level of funds available for credit in subsequent years could well have contributed to an associated reduction in demand for other agricultural inputs, say seeds.

Exchange rate.[13] The negative effects of an overvalued currency on agricultural production have been well documented by Norton and others in the late 1980's. The negative impact on demand for production credit was well documented by Robert R. Nathan in 1989. Their findings, to the degree used here are reproduced with little or no modifications.

Table 7 shows the overvaluation of the Colon relative to the US$, El Salvador's largest trading partner. An overvalued currency tends to make imports of grains and other agricultural commodities cheaper than the same commodities produced in El Salvador. This is so because when the imported commodity is paid for with an overvalued currency, only a fraction of the true value of the imported commodity is paid. However, when the same commodity is purchased in the country, the full price is paid in Colones. Thus, the incentive to buy abroad and import rather than to buy locally is greater the higher the overvaluation of the national currency. As Table 7 shows, this scenario worsened during the 1980's in El Salvador.

An example will serve to explain the negative effects of this situation. In 1987, the exchange rate was 5.00 Colones per US$, however the parity exchange rate was 8.33 Colones per US$. This amounted to an overvaluation of the Colon of 66.5%. Thus, by 1989, " a situation was reached when nationally produced commodities such as corn had such a low price that farmers (say grain producers) do not earn an income, and at the same time (due to overvaluation of the currency) the local price is too high in relation to the international price of the corn" (Nathan, page 79). Farmers do benefit some from the overvalued exchange rate, in that imported agricultural inputs are bought without paying their full price. Nevertheless, the cost of (imported) inputs explains only a relative small fraction of the decline of gross income.

The overvalued exchange rate has been the principal cause of reduced producer prices in the country, although low international prices and reduced domestic

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[13] Robert A. Nathan, page 78-79.

demand have also contributed. Norton points out (1988) "...that it is not the volume of imported agricultural commodities which depress domestic production, but rather the prices (domestic versus international) and the exchange rate which have been the main factors resulting in lower international prices relative to domestic prices." In other words increased import levels do not cause the decline (are not the direct cause) in domestic production, but rather both changes (increase import levels and depressed domestic production) are the result of a third factor, namely an overvalued exchange rate.

The Real Effective Exchange Rate provides the same argument (last column, Table 7). The lower the index, the cheaper the exchange rate, and therefore the hard currency that can be bought. The higher the index, the more expensive the exchange rate, and therefore the hard currencies that can be bought, ergo imports. The series clearly indicates the "cheapening" of the exchange rate between 1974 and 1988. Under these circumstances, imported grains became increasingly "cheaper" to buy over the domestic alternatives. The macro-economic adjustments in 1989 and 1990 managed to increase the cost of the exchange rate, and therefore imports. If continued, grain users will be encouraged to expand their purchases of domestic grains.

International versus domestic agricultural prices. A series of price indices for agricultural imports to El Salvador were documented by Norton et al. (1988). His findings, as summarized by Nathan, page 78, (1989), are reproduced here in the context of the seed industry. According to the study, between 1980 and 1986 the price index for agricultural imports, in current Colones, increased by 30%, while the production cost index for nationally produced foods rose 74% (to a degree reflecting differential inflation rates).

Under these circumstances the incentives to import agricultural commodities (including grains) rather than buying locally produced was great. Moreover, many of the imported food commodities were imported (and some still are) under concessionary terms. For example, in 1987, imports for grains were 83,000 tons of corn, 23,000 of rice, and 123,000 tons of wheat.

Increasing import levels contributed to a reduction in demand for locally produced grains. Reduced demand for locally produced grains (probably reflected in depressed real farm gate prices) reduced farmers' incentives to produce for the local market. This in turn led a reduction in demand for agricultural inputs, such as seeds.

The Agrarian Reform - a Pivotal Development

The agrarian reform was the most important public statement to legitimatize the government which assumed power in October 1979. Under different schemes, private agricultural property was confiscated, compensated, and redistributed to farmers.[14] This action had three negative consequences on the seed industry.

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[14] The agrarian reform has been documented in many studies and will not be reviewed here except as it pertains to the seed industry.

First, many of the farm units formed under the agrarian reform schemes did not have or did not retain the needed farm management skills to sustain them as profitable farming enterprises. Second, several of the seed producers lost their land and stopped producing seed. Many did not recover, and a few took years to resume production.[15] Third, neighboring countries which were major customers of the Salvadorian seed industry found their supplies curtailed or no longer available.[16] Combined, these three outcomes lead to a reduction in seed demand in the domestic market, and faced with reduced supplies, to increased seed production activities in previous client countries.

The Decline of the Extension Service

To a large degree, the agrarian reform was responsible for the reorganization of the structure of the extension service, and changes in its priorities, programs, and activities. These reorganization and changes led to a complete collapse of the effectiveness of the extension service in relation to the objectives of the basic grains program originally designed and implemented by CENTA.

First, the Ministry of Agriculture was decentralized into four independent regional units, which though theoretically linked to the main office in San Salvador carried about their programs and activities in a very independent manner. These units essentially became autonomous mini-ministries.

Second, new program and extension activities took priority over CENTA's original basic grains extension program objectives. Extension priorities were shifted to social issues such as housing, health, education, communication, infrastructure, and the management of newly formed cooperatives.

Finally, CENTA's extension personnel were transferred to the autonomous regional ministries, and their efforts redirected to new program priorities.

As a result of these developments, the critical link between research and extension was severed and information on new hybrids, cultivation techniques, and other research developments ceased to flow to grain producers. CENTA became isolated from the clientele it was supposed to serve. Extension no longer advised farmers on the benefits of hybrids and related cultivation techniques and the initially successful drive to increase its utilization race faltered.

Other Factors

There are many other factors which to one degree or another contributed to the decline of the seed industry in El Salvador. Since these are difficult or impossible to quantify, a brief qualitative review of these is provided below.

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[15] One major seed enterprise took 4 years to get back into production.

[16] One previous seed producer in El Salvador is now the largest seed producer in Guatemala.

The farmer as a competitor. If there is one agricultural input a subsistence farmer can substitute rather than buy, it is the seed he will plant. From the very beginning the industry was faced with the rather difficult task of convincing farmers that hybrid and improved seeds were better than his own. Daunting at best during the good times (1960-1979), this proved impossible during the bad times (1980-1989). As the economic condition for grain farmers deteriorated the first thing they resorted to, in increasing number was the substitution of their own seed selection for purchased seeds. This is evident from the exercise undertaken to estimate true hybrid corn production in Section II.

Loss of export market. The export market represented a significant portion of the volume of certified and improved seeds marketed. The agrarian reform confiscated private farms which were dedicated to seed production. As a result these production units ceased to produce seed altogether or for long periods of time. Having lost their foreign supply source these markets developed their own successful internal seed sources.

Lack of successful new hybrids. As shown in Table 12, CENTA has released a string of hybrid and improved lines for corn, sorghum, and rice. While this effort has met moderate success with sorghum and rice, all releases in corn after H5 in the mid 1960's have met with failure. For one reason or another (mostly technical and financial reasons) seed producers were not able to produce these new releases, and grain farmers were not able to increase productivity beyond that given by the initial hybrids. This lack of new, more productive hybrids combined with the other major factors led to a decline in the use of the original hybrid lines and a corresponding increase in the use of selected seed by grain farmers.

Credit. As alluded to previously, production credit being a derived demand declined as its marginal value decreased. Consequently, seed demand, being tied to production credit also decreased.

Seed industry structure, conduct, and performance. This topic has been reviewed in Section II. The seed industry has become less and less competitive, especially as it evolved since 1980, to the point where its protectionist structure today, vis a vis, the structural adjustments taking place in the nation and regionally is in danger of making it a non-issue.

Civil conflict. The civil conflict which started in 1979 affected demand for commercial seed, specially in certain areas of the country. Nevertheless, the significance of this factor is outweighed by the economic, structural, and market factors.

Weather. Weather has not been a factor. The periodic droughts and extremely wet periods have not been consistent and prolonged enough over the 30-year period to have affected seed demand in any significant way.

Real Use of Certified Corn Seed. In reviewing the corn production statistics provided to the team by the División General de Economía Agropecuaria (DGEA) and CENTA, and comparing such information with the often heard statement about the

high rate of hybrid corn seed usage in the country, a disturbing discrepancy between what is assumed to be true and what is really happening became evident.

The production statistics gathered by DGEA distinguish only between hybrid corn (white corn) and national, that is "criollo" corn (corn of various colors).[17] The statistic is silent about the use of "segunda", that is the amount of white corn seed selected and kept by farmers, assuming it to be hybrid. When production estimates are gathered, the corn produced from "segunda" is reported as hybrid. Of course, a hybrid seed can be used only once, thus what is reported as hybrid contains much corn produced from second or older generations.

Furthermore, a trend analysis on yields clearly shows a stagnation after the initial impact of the H-3 and H-5 varieties in the early 1960's. On the contrary, what is being reported as hybrid corn yield has been gradually declining over the last two decades, a tendency which is very contrary to the expected results of a hybrid program. The implications of this statistical aberration is shown in Table 8 and Figure 6.

Using generous assumptions about seeding rates, yields, unsold seed stocks, no seed exports, and no grain losses, the gap between what is being reported as hybrid and what is not has been increasing steadily during the last decade.[18] As the true use of hybrid corn seed has declined, the share of older generations (segunda) has increase like a mirror image. Furthermore, the share of "criollo" corn in total production has been increasing steadily since the early 1980's.

What this disturbing scenario could be indicating is (1) the disapproval of farmers with the hybrid corn seed being offered in the market, (2) his increasing inability to afford hybrid seed, and (3) that exports played a far greater role than what is commonly known and accepted. The implications for (1) sub-sector policy making, (2) forecasting seed demand by the industry and adjusting supply, and (3) aligning the seed research program, among others, should be evident.

Recent Changes Favoring a Reactivation of the Seed Industry.[19] Since June 1989 the GOES has implemented a series of policy changes affecting macroeconomic variables, economic sectors, and trade which have begun to set the stage for a general economic turn around. More important, these changes have created a more propitious overall base for the reactivation of the agricultural sector in the nation. The results of these changes have created a unique opportunity for the seed industry to reverse its current negative trend and start a reactivation which will contribute to the recovery of the agricultural sector and specially the basic grains sub-sector. The most relevant changes are summarized below.

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[17] See Appendix 1.

[18] The simple model was run with changed assumptions, however the tendency remained.

[19] For a detailed review of these changes see "Estrategia y políticas para el desarrollo del sector agropecuario, 1991-1994, agosto 1991, Unidad de Análisis de Políticas Agropecuarias, MAG. Pertinent sections have been lifted and used in this part of the report.

Macroeconomic Changes

- The Colon has been devalued and a market determined exchange system has been implemented.
- The federal deficit has been reduced from 1,340 million Colones in 1989 (4.2% of GDP) to 347.1 million Colones in 1990 (0.8% of GDP).
- Import tariffs for imported goods which ranged from 1% to 290% have been adjusted and realigned to between 5% and 20%.
- Exemptions from import tariffs which favored certain privileged private and public institutions to the detriment of those not benefiting from the same have been eliminated or curtailed.
- Reforms in the tax system have been initiated to simplify the system, reduce the tax brackets, and eliminate exemptions.
- Price controls for over 200 products have been eliminated, including grains.

Sectorial Changes

- State monopolies which intervened in the production, marketing and trade of agricultural commodities have been curtailed or eliminated (INCAFE, INAZUCAR, COPAL, ISIC, IRA).
- Export taxes on agricultural commodities have been reduced or eliminated.
- The 5% sales tax on agricultural inputs has been eliminated.
- An import price band with a uniform import tax of 20% for yellow corn and rice has been implemented. Studies for sorghum and soybean are underway.
- The amount of credit available for the agricultural sector has increased in real terms for the crop years 1990/91 and 1991/92.
- Starting with the 1989/90 crop season, positive real rate of interest for production loans are being charged.
- Bad debts amounting to 550 million Colones accumulated by the reformed sector (Phase I) have been refinanced, making these cooperatives eligible to new production credit.
- MAG is undergoing restructuring in an effort to make this institution more efficient and effective.
- The extension service is being restructured and the "Extension by Objective" mode is being introduced.
- A resolution has been approved by all Ministers of Agriculture in Central America to harmonize the agricultural policies of the nations in anticipation of the regional market integration for agricultural commodities.

Results So Far

- The devaluation of the Colon and market determined exchange rate has eliminated the "desprotección" of the agricultural sector, vis a vis, tradeable commodities and evened out the terms of trade between the rural and urban sectors.
- Market and price distortions for agricultural commodities and services have been reduced or eliminated.

- The price band has provided effective protection for both producers and consumers of basic grains (corn and rice), while letting international prices orient the market for these grains.
- The annual inflation rate was reduced to under 20% during the 1990/91 crop year, and is expected to decline even further during to around 16% for the 1991/92 crop year.
- Real prices for basic grains have been higher in real terms during the last two crop years.
- The agricultural sector turned around, increasing 0.5% during the 1989/90 crop year and 7.4% during the 1990/91 crop year.
- Record grain crops were registered for the 1990/91 crop year, increasing 4.3% over the previous crop year. Similar results were expected this crop year, however the drought has reduced expected production to the 1989/90 levels.

These recent changes and results so far are not only encouraging, but additional macro, sectoral, institutional, and trade related adjustment to be undertaken during the next two years give further reason and justification for a serious effort in reactivating the seed sub-sector.[20]

Summary Outlook. The decline, current status, and potential outlook for the seed industry in El Salvador has been summarized in a schematic way in Figure 7. Beginning in the late 1970's, the trends for farm gate prices for grains and production costs began to decline in real terms. However, the index of decline for the farm gate prices was steeper than the production cost index. As the gap between these two indices shrank, farmers were forced to adjust production patterns, and therefore production inputs. This economic juggernaut was compounded by other external factors, such as the decline in the extension service, the lack of credit, few or no releases of successful new hybrids and improved varieties, etc.

As a result, seed (and most likely fertilizers and chemicals) suffered declines in their marginal value products, that is in their worth to contribute value to the production of basic grains. However, seed unlike fertilizers and chemicals is "perfectly" substitutable, that is farmer's can produce "seeds" as well, and at a lower cost than the seed industry. Thus, as its marginal value product declined, the demand for certified seeds also declined, as farmers chose more and more to keep their own, the famous "segunda". This result is simulated by the decline of both indices, until 1989.

The lagged effects of the adjustments to macro, sectorial, and trade related policies that began in June 1989, as well as those expected from future adjustments are shown (expected) to result in an inverse mirror image for the trends of the indices. In other words, the farm gate price index will show a positive slope as real farm gate prices remain positive and even increase in real terms. While the index for production costs is expected to increase as well, its slope, ideally should be less steep that the farm gate price index, and at worst parallel.

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[20] For a detailed listing of these changes see the strategy document of MAG.

If sustained,[21] the widening future gap between the farm gate price index and the production cost index will increase the marginal value product of certified seeds (and other agricultural inputs) and lead to higher demand by farmers. This, in short is the window of opportunity that the seed industry in El Salvador has, to work towards reclaiming its valuable position within the agricultural sector in El Salvador.

Given the positive outlook presented above, it begs the question about the outlook for the certified seed industry. In other words, is there a potential for increasing production and sales of certified seeds, and if so how much? This question has been addressed and summarized in Table 9.

Total potential demand for hybrid corn and improved varieties of sorghum and rice was estimated indirectly by calculating the replacement rate that actual industrial seed production represents as a percentage of total need for seed.

For example, a total of 231,000 Mz of hybrid corn were cultivated in 1989/90. A unified planting rate of 33 lbs and a yield of 47 qq/Mz were assumed to hold for commercial corn production, certified seed production, and basic seed production.[22] The total seed needed to plant 231,000 Mz with hybrid corn would have been 76,230 qq. At a replacement rate of 54.5% roughly equivalent to replacing the total seed used every 2 years), the demand would have been 41,545 qq of certified corn seed, the same amount of certified corn seed produced by the seed producers. However, the industry did not sell all the seed produced, and roughly 10,000 qq remained unsold.

What this means is that the potential demand for certified corn seed ranges between a minimum replacement rate of 40% and optimistically a maximum of 66%. In other words, if the positive macro and sectoral developments continue, and the industry is capable of pushing hybrid corn seed replacement to a rate of 66%, or an equivalent to a complete replacement every 1.5 years, then the industry could sell approximately 50,000 qq of certified hybrid corn seed per year, given the same acreage.

Given the potential of 402,000 Mz of corn and a replacement rate of only 34.5%, (the equivalent of one replacement every 3 years) the total potential is even greater if farmers can be persuaded to substitute national or criollo corn with hybrids. A 60% replacement rate would be equivalent of 72,500 qq of certified corn seed. This must be taken as the absolute maximum of certified corn seed this market could absorb.

Similar, and perhaps better conclusions can be made for sorghum and rice. Improved sorghum is being replaced at a replacement rate of 50%. However, this sorghum represents only 17% of the total area cultivated. This the total replacement of 8.5% could be increased substantially, again if farmers can be convinced of the benefits.

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[21] This is contingent on continued success of future macro policy changes, structural reforms, and trade related adjustments.

[22] This can be changed for each system if required.

Rice, at a replacement rate of 22% offers room for improvement as well, with a 40% replacement rate or the equivalent of 21,300 qq of certified seed being reasonable. This would double current rice seed production levels.

Seed Industry Structure, Conduct, and Performance[23]

In its most basic form, an analysis of the market structure, conduct, and performance for a single commodity or a group is an attempt to compare the effectiveness of the market system in providing the desired goods and services, vis a vis its efficiency in doing so. The three concepts are integrated in a cause and effect relationship, and together explain the dynamics and results of the system.

A given market structure, with particular and well defined characteristics generates a conduct which is unique and predictable to a degree. These structural conditions and its conduct result in a performance which can be effective or in-effective, efficient or in-efficient, progressive or retrogressive, equitable or discriminating.

The results of the market system appraisal are compared with similar markets in other countries as well as other empirical evidence allowing the analyst to assess the desirability of its conduct and acceptability of its performance. In turn, this step permits the generation of conclusions and recommendations designed to improve the structure, conduct and performance of current system.

The scope of this type of analysis depends on the availability of information, previous analyses of the system which provide base line information, and time devoted. Lack of previous market studies and limited information somewhat constrained this first attempt in analyzing the structure, conduct and performance of the seed industry in EL Salvador. Nevertheless, the observations, measurements, and comparisons obtained did provide useful insights used in formulating the conclusions and recommendations.

Structure. The structural analysis attempts to ascertain whether or not the existing structure is conducive to competition or not. The degree of competitiveness is measured in different ways, including the number of participants and commodity flow, industry concentration, access to information, ease of entry and exit, public-sector participation, and the set of laws and regulations that affect the structure.

Participants and Flows

The current market structure for certified seeds in El Salvador is shown in Figure 8. The participants include public and private-sector institutions. All certified grain seeds (white corn, sorghum, and rice) are produced by only 13

[23] This section benefitted from Dr. Hugo Ramos collaboration and previous report on Postharvest Grain Handling in El Salvador: An Economic Analysis.

registered certified seed producers.[24] They are all members of the Association of Seed Producers, or Asociación de Productores de Semillas (ASPRODES). They are registered and licensed by CENTA to produce and market certified seeds. CENTA also produces and sells its own brand of certified seeds.

While all seed producers use the same foundation seed available from CENTA, they all produce certified seeds under their own brand name. Seed production takes place at 17 active and scattered locations throughout the country (see Appendix 6). Over the years, the approved seed production sites have changed locations and their numbers has varied from as high as 33 in 1986/87 to the 17 under production in 1989/90.

From these scattered locations, seeds are brought to three centrally located processing plants for processing and storage. All three plants are located near San Salvador. One is owned by the GOES and is located at CENTA, near San Andres. The other two are owned by seed producers, one located at the Sonsonate/Santa Ana road junction (Prosela, S.A.), and the other near the Ilopango airport outside San Salvador (Semillas, S.A.). Thus, 11 of the 13 registered seed producers pay the owners of the two private plants a custom fee to have their own seed processed and stored. The distribution of custom clients is summarized in Table 10.

Seed distribution is generally undertaken through a great number of larger and smaller agricultural input stores (agroservicios) which retail the certified seeds to farmers. There are at least 400 registered and active agroservicios in the nation. Some seed producers sell their seeds through commission agents who may sell more than one brand on a commission basis to the agroservicios or to the larger cooperatives. Some of the cooperatives will have their seed purchases delivered directly from the processing plants to their locations.

Industry Concentration

The impact of the structure on conduct, and therefore performance can be measured by the coefficient of concentration within the industry. While concentration itself does not imply collusion or lack of competition, it is well accepted that the higher the concentration ratio the more the likelihood that free market competition and therefore efficiency are less likely to predominate. Possible areas of concentration include production, processing, and distribution.

Producer concentration.[25] The concentration of seed producers and volumes has changed over the last decade. During the last year before the agrarian reform, the industry consisted of seven private producers and CENTA. Within the private sector, two producers accounted for 55% of all the certified corn seed produced. These two producers also owned one of the processing plants. CENTA accounted for 100% of all the certified rice and sorghum seed produced.

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[24] See Appendix 5 for membership.

[25] See Appendix 6 for detailed annual information on seed production.

After the agrarian reform, the number of seed producers increased, with many new entries being registered by CENTA. Not all, however produced seed every year. For example, during 1984/85, there were 27 private producers and two in the public sector, namely ENA and CENTA. Of these, 12 did not produce seed. Industry concentration was slightly diluted, when three producers of corn seed accounted for 57% of the market. Rice seed production shifted to the private sector, where six producers accounted for 77% of the production. CENTA still accounted for 68% of the sorghum seed production.

A peak of 30 registered seed producers was reached during 1986/87, of which 11 did not produce. Concentration was diluted slightly to four producers who accounted for 69% of corn seed production. Rice production shifted even more to the private sector which accounted for 89%, while sorghum seed production was nearly totally within the private sector, accounting for 92%.

These changes in the structure of the seed industry, while positive must be viewed with certain caution. First, the small dilution in corn seed production (from two to four) still left a high percentage in the hands of those four producers. It must also be noted that during this time period (1980/81 through today), at most three producers attempted to produce all three seeds (corn, rice, sorghum) every year. For example, during 1986/87, only one seed producer produced all three seed grains. Three producers accounted for 59% of the rice seed produced out of seven producers. Two sorghum producers accounted for 56% of all the sorghum seed produced.

By 1989/90, the industry had been reduced to 16 certified seed producers, 13 in corn, eight in rice, and three in sorghum. The four largest corn seed producers accounted for 65% of the production. The owners of the two private seed processing plants accounted for 40% of the corn seed production. In rice there was no domination, with production acreage being distributed fairly evenly among the eight producers. In sorghum, seed production was dominated by two private-sector participants which produced 85%, the rest being produced by CENTA.

The owners of the two processing plants did not participate in the production of rice and sorghum seeds during the 1989/90 crop year.

What this situation between 1980 and the middle 1980's indicates is that in spite of more seed producers entering the industry and the increasing participation of the private sector in the production of rice and sorghum seeds, the high potential for little or no competition still existed. With the shake-out of the industry taking place, by the end of the decade, the industry, with the exception of rice seems to be reverting to a high degree of concentration. Under these conditions, market competition is not likely to be keen, a situation corroborated by the "well intended" but futile actions of the seed industry to control acreage and prices.

Processor concentration. The existence of only two processing plants within the private sector, providing custom services to 11 out of 13 certified producers would indicate a high degree of concentration at this level. It must be emphasized that the two processing plants belong to seed producers who sell their own brand of seed. The likelihood of strong price competition under these circumstances is not very high, since a custom client is likely to feel the

"competitive" consequences of underpricing his brand in competition with the brand sold by the owner of the processing plant which processes his seed.

Distribution concentration. With over 400 agroservicios in the country distributing seeds and other agricultural inputs, concentration, and therefore collusion is not highly likely. Field observations and discussions with industry representatives lend the belief that the level of competition is very high at this level.

Ease of Entry and Exit

For several reasons, entry into the certified seed industry in the country is difficult. While one of these difficulties could be "natural", all others are consequences of "mandated" norms or in-effectiveness. Those identified by the team are listed below.

Capital investment. The industry can require high capital investments for the production, processing, storage, and distribution of seeds. To a degree, these investment requirements are given, however to another, these are "required" by law (see Section III). These "legally mandated" capital needs make an effective barrier to entry and give protection to the existing excess capacity in processing and storage.

Credit. Seed production, processing, storage, and marketing requires long-term credit for capital investment and revolving credit for working capital needs. According to seed industry sources, it is very difficult to secure a revolving working capital account and impossible to obtain credit for long-term capital investment.

Security. While some seed producers recognize the potential for investment in the industry, such opportunity is dampened by the risk of having the investment destroyed.

Legal requirements. The legal requirements may be the greatest obstacle to entry and competition within the industry. So many technical, professional, equipment, and other conditions are set, to make venture capital wonder whether such a controlled environment is worth investing in (see Section III).

Well-meant intentions. The Seed Growers Association (ASPRODES) and the National Seed Commission are institutions created to promote the interest of the industry. Since the mid 1980's, they have undertaken well intended efforts to find ways and means to overcome the decline of the industry. Five national seminars and workshops have been undertaken since 1987 from which new certified legislation and regulation proposals have emerged (see Appendices 10-13). Unfortunately, many of the well intended suggestions contained in the proposed new seed law and association requirements will deter rather than encourage entry into the industry (see Section III).

Public-Sector Participation

CENTA does produce and sell certified seed, in "competition" with the private sector. This operation represents a source of income to the institution, which is under-funded and over-staffed. The degree of participation was analyzed earlier. Today, its participation (1989/90 last available information) is 3% in corn, 14% in rice, and 15% in sorghum. Its production of seed corn is limited to released varieties not well accepted by seed producers such as H-17, and H-53. However, in rice it is competing directly with private-sector producers. In sorghum, it produced the Isiap-Dorado variety which was not produced by the private sector.

Market Information

The information available and used by the industry is rudimentary at best. Little is quantified through unbiased and reliable methodologies. What little is available such as volumes, flows, prices, destinations, uses by client, remaining stocks, etc., is not openly available. Whatever information is available is highly concentrated in the hands of few.

This lack of information, analysis, and dissemination in and open, timely, and unbiased manner has no doubt contributed to a degree to the well intentioned yet fruitless actions taken by the industry to control supply and prices. The fact that large volumes of unsold corn seed has been re-occurring every year in recent years, and the severe shortages in rice and sorghum seeds during the last two seasons attest to the need for an information system to compile, analyze, and disseminate production and market information for the industry on timely basis.

As it is now, the industry seems to be working more by well meant and educated guesses rather than solid market and demand information. As these "guess-estimates" prove themselves off the mark year after year, either on the long side as in corn or on the short side as in rice and sorghum, production of seed will continue to take place in a very speculative and uncertain environment.

Conduct. The conduct of a market system concerns itself with how the system "behaves", that is, how the behavior of the participants impacts on price determination, equity, and the effectiveness of the system in satisfying both buyers and sellers.

In a market economy, prices are determined in a dynamic way, and at a level where sellers and buyers are satisfied. Under this mechanism, price discovery balances supply and demand and the market is cleared. This market determined price clearing mechanism brings about a just and equitable distribution of the costs and benefits generated by the economic activities of the market system. Producers and suppliers of goods and services obtain payment commensurate with their efforts and costs in providing them with the incentive to continue in the business and expand. On the other hand, the buyers of goods and services exchange money for the anticipated satisfaction that they will receive from the acquired goods and services. Such an exchange is just and satisfying to both parties.

While the current production, processing and distribution system for certified seeds seems effective in getting certified grain seeds to producers, certain behavioral patterns among and between participants are less than ideal, undermining its efficiency, equity, and future staying power. Those observed by the team, the perceived reasons for such conduct, and their positive or negative consequences are listed below.

Positive Conduct Factors

Observations of conduct contributing to efficiency, equity, and effectiveness within the certified seed industry include:

Competitive market at the agroservicio level. There are over 400 registered and active agroservicios in the nation. Many more are not registered. Each town has several and villages tend to have more than one. This situation provides farmers with comparative choices for selection of his input purchases. This market situation provides the incentives for the agroservicios to stay competitive in order to retain their customers.

Extension services provided by agroservicios. Many agroservicios are owned by professionals who are in a capacity to provide advice to farmers, and are incentivated to do so in order to keep their business. Many managers and employees of these retail outlets could be more effective with additional training and extension material.

Resacking of seeds at the agroservicio level. Agroservicios have responded to the need of the majority of grain producers to purchase seeds (and agrochemicals) in small quantities, ranging from 1 pound to 25 (or one arroba). The resacking of the 50 lb bag of certified seed into smaller lots is necessitated by the small size of the area cultivated by a single farmer, and the need to replant portions of a field when its does not germinate.

Use of consignment sales. Seed sales on a consignment basis is common towards the end of the planting season. This marketing tool is an effective way of minimizing possession risk at the retail level while at the same time avoiding a possible stock out and lost of sales. While this merchandising technique pushes the risk of ownership back to the seed producer level, it allows for sales, albeit in small and inefficient lots up to the last moment during the planting season.

Negative Conduct Factors

Observations of conduct not contributing to efficiency, effectiveness, and equity within the certified seed industry include:

Lack of competition at the seed producer level. The drastic decline in demand for certified seeds over the years has prompted ASPRODES to act in a well intentioned way to "control" supply of seeds and meet demand in a market clearing fashion. This intention, however well meant, has not only fallen short of its goals, but implies a host of anti open-market criteria, that if prolonged will contribute to the disappearance of the certified seed industry in the country.

The basic action taken by ASPRODES and CENTA, which form the National Seed Commission, consists of (1) estimating seed demand for the up-coming crop year, (2) assigning seed production acreage to members of ASPRODES, (3) fixing the selling price at the different market levels (based on the production costs of the members and a fixed rate of return), and (4) trying to get the Government to carry a 10% emergency stock of seeds.

The results so far indicate that this strategy has failed, as shown by the stocks of unsold corn seeds at the end of the planting seasons, the shortages of rice and sorghum seeds (both failures to estimate demand correctly), the inability to stick with the fixed selling price (or rather the need to break away from the agreed sales price), and the increasing pressure being put on the Government to keep an emergency stock of 10% of estimated needs.

These attempts to fix monopolistic prices under collusive agreements not only result in prices which are socially inefficient, but make a fair distribution of the benefits and costs among market participants impossible. These non-market pricing conditions fail to reflect true social needs for goods and services as well as the desire and capacity to pay for them; quite the contrary, they merely reflect the interest of a group of market participants to extract "rents" (earn un-earned profits) from the system.

The pricing results and rents extracted by seed producers during the 1990/91 season are highlighted in Table 11. If the production numbers are taken at face value, a suggested (and approved by MAG) mark-up of 15% sounds modest on an annualized basis. However, the individual mark-ups between producer/processor level and wholesale ranged from a negative 33% to a positive 42%, and from a negative 25% and 60% between the producer/processor level and the suggested retail price. Under these conditions, two producers had negative returns, three had returns raging form 0 to 15%, and three had returns above 15%.

The most efficient (based on qq/Mz) seed producer not only managed to extract "rents" by weighing the pricing scheme in his favor, but due to his size also managed to protect (cover-up) inefficient seed producers, who otherwise would have had negative returns. Extracting this producer from the calculations and "redoing" the numbers would have given a suggested price to distributors of C212.42 per qq and a retail price of C239.00 per qq.

What this simple exercise clearly portrays is that rents are being received by those who can take advantage (are relatively more efficient than others within the protected environment, or have inside market information), and inefficient producers are being protected from the "good" forces of competition.

When competition is removed from the production, processing and marketing system for grain seeds, the desire and need to innovate, increase efficiency, improve quality, and provide better services atrophies. If this collusive arrangement continues, it will be only a matter of time until other sources (foreign) will find it profitable to make in-roads into the Salvadorian seed market (due to the rents created by the price fixing scheme being used here). With their competitively priced products, and high quality service, it will not be difficult for them to rapidly increase their market share.

Lack of effective use of basic merchandising techniques. The industry is not very innovative (or discourages innovation) in merchandising. For example, advertising to create brand loyalty is rarely used, and volume discounts are not used. Transportation costs are not always reflected in the retail prices offered. The first tends to shrink the potential total demand faced by the industry, and the second fails to account for total spatial distribution costs.

Lack of product differentiation is another conduct which hurts the industry. For example, no price differentials are offered between the two available hybrid corns in the market, though one tends to yield more than the other (H3 versus H5).

Another merchandising weakness in the industry is its inability or willingness to market seed in certified containers of different sizes all the way to the producer level. If the market demands such service, say 10 lb bags, or one arroba, and not 50 lb bags, then the industry has the potential to provide such service at an additional premium. Naturally, the critical question is whether the market, that is the grain producers, have the purchase power to pay for such additional service and convenience. A market analysis of current practices would be sufficient to figure out the best possible combination of different size containers. A market test (pricing exercise) would suffice to determine customers' willingness to pay for such service and convenience.

Concentration, size, and location of physical infrastructure. The concentration, size, and location of the physical infrastructure used to process and store certified seeds is another cause for inefficiency within the industry. With only three plants and 13 producers, many have no choice but to have their seeds custom processed by the two private plants or CENTA. Though no information was made available on the volumes processed at each plant, it becomes evident from the client list of the private plants that most seeds are processed privately. Under these conditions, it becomes impossible for a custom client to aggressively underbid the price of the brand produced by the firm which custom processes.

The industry has more than enough capacity to process at least double the volume being processed today. This unused capacity bears heavily on the costs being used to fix the prices each season, since the lower the volumes processed, the higher the price must be in order to obtain a breakeven point. As demand declines, it becomes more and more difficult to process enough volume to cover all costs (including depreciation) and still maintain a viable operation.

The location of the three plants adds additional transportation costs, since all seeds must be trucked to these central locations and returned to grain producers, many next to the site where the seeds were produced. This double haul can add between 6 and 12 Colones per quintal of seed.

CENTA's production and sales of certified seeds. CENTA's production and sale of certified seeds has the potential to diminish the private-sector component of the industry, if it produces those seeds demanded by grain farmers. For reasons explained elsewhere, CENTA cannot produce competitively and is unable to recover its costs. Its sales can only diminish the market volume which the private sector could easily satisfy, especially in a shrinking market.

Testing of seed at the agroservicio level. Most agroservicios will germinate the seed provided by seed producers for sale. The reason is two-fold, first they need to "assure" themselves that the seed provided is good, and that "old" seed is not being sold as "new". Second the agroservicios need to convince the grain producers that the options available (say H3 versus H5) for purchase are acceptable.

What this "service" attest to is the lack of confidence that agroservicios as well as farmers have in the seed industry and the certification service. In other words, the effort put by both sectors in the certification process is simply being wasted. Agroservicios and grain producers are wary of being sold "old" stock, that is seed from the previous season, or simply bad seed, and they protect themselves accordingly.

Resacking of seeds at the agroservicio level. The distribution of seeds in only 50 lb bags satisfies only a small portion of the retail market. Resacking at the retail level occurs because grain producers demand for such service. Not being able to provide such service, that is smaller bags at a reasonable cost, while maintaining certification hurts the "good will" (integrity) of the industry, and reduces total potential demand.

Effect of monopolistic pricing practices on the credit system. A very detrimental spin-off of the attempt to regulate supply and prices of seeds is the impact such practice has on the BFA and its mechanism used to establish credit lines and limits for grain farmers. These then tend to be biased towards the high side (this is compounded by the irrealistic seeding rates and yield assumptions, as well as other imputed costs not incurred by farmers), which then leads to a less than optimal allocation of available credit funds.

Lack of integration of seed industry and other participants. The seed industry has organized itself around two institutions, namely ASPRODES and CENTA, which together form the National Seed Commission. The lack of representation by other market participants such as agrocervicios, grain producers, and Defensa Agropecuaria at the Commission level has robbed the decision-making process from valuable and justified input. Thus, decisions affecting the intermediate and final users of seed are being made without their participation, making such decisions questionable in intent, quality, and impact.

For example, as a result of the V Seminar of the Seed Industry in El Salvador on June 17, 1991, it was decided on the basis of comparative production studies undertaken by CENTA to cease production of the H3 corn hybrid. The critical variable was yield, in which new hybrids such as H57 an H53 very easily outdistanced by the old "standby". Thus, for the 1991/92 season, the country will have only the H5 and a new hybrid with untested marketing characteristics. During the decision making process, no mention was made on the demand characteristic of the old hybrid, whether or not it is better suited for certain areas than the new hybrids, and whether the production problems which doomed other releases would be overcome. Finally, for the crop year 1989/90, seed production information shows that H3 accounted for 32% of the hybrid corn seed produced. No doubt, better decisions can be taken if all participants are represented in the process.

Disposition of unsold seed stocks. According to the existing seed law, all seed which has been decommissioned must be burned or buried. This law has been usurped by the very institution which is suppose to uphold the law, when a lot of seed was deemed suitable for animal consumption, after washing. This decision was taken by CENTA after feeding trials and laboratory analysis of the animal carcasses. The reason given was, that the respective seed producer would have incurred a sizable loss.

Inability to predict demand. The inability to predict demand for seeds has led to excess supplies in corn seed and carry-over stocks, which increases the total costs faced by the industry. This also contributes to the credibility issue associated with the testing of the seed at the agroservicio level. On the other hand, this inability also leads to windfall situations when seed production falls short of demand, as in the case of rice during the 1990/91 season, when inferior quality rice (red tag) sold higher than superior rice seed (blue tag) as seed supplies dried up and demand stayed high.

Performance. Performance is the result of the structure of the system and the conduct of its participants. In this sense, performance has the same meaning as the concept of efficiency, which in turn has two dimensions, namely an economic and a technical. The criteria used to evaluate these two dimensions of the concept of performance include the measurement of efficiency, that is cost versus benefits or results, level of technology used and the rate of adoption or adaptation (rate of modernization), employment generation, skills of employees, foreign exchange savings, equity, and environmental considerations.

Because information was hard or impossible to come by, this concept is the most difficult to measure and evaluate. Nevertheless, some of the observations made during the field trips and conversations held with participants provide useful insights into the concept of performance in the seed industry. The most salient points are listed below.

Positive Performance Factors

The seed industry structure and conduct is in part sound and conducive to positive performance in certain areas and levels of the system. The positive performance factors are listed as follows:

Level of effectiveness. The current structure and conduct of the seed industry allows it to perform in a relatively effective manner, in that certified seeds reach grain producers on time, in the form (package) required, and in sufficient quantities.

Level of efficiency. A the wholesale and retail level, that is at the level of agroservicio, the industry appears to work in a very competitive manner, mainly due to the large number of such businesses. This situation leads to price competition and therefore a high degree of efficiency.

Employment. Within the private-sector the industry has created employment sources at the different levels of the industry. Probably the largest beneficiaries have been manual laborers, utilized intensively at the seed production level.

Skills. The basic technical skills of CENTA's staff engaged in seed research and certification are good. Periodic training at CIAT and CYMMET has kept a degree of currency.

Negative Performance Factors

The current structure, regulatory environment, and conduct of the seed industry compel it to operate at a performance level which is far below its potential. The factors related to negative performance are listed as follows:

Level of efficiency. The seed industry could reach higher levels of efficiency at the producer, processing, and distribution to the wholesale/retail level. This potential is possible if the negative points in regard to structure, conduct, and the regulatory environment are addressed and resolved.

Technology use. The seed industry uses technology adopted or adapted in the late 1960's and 1970's. Little new technology has been introduced. Moreover, perfectly good technology and infrastructure has been permitted to decay beyond repair within the public sector.

Employment. Within the public sector (CENTA and DA), over-staffing of certain divisions has led to a situation were over 90% of the annual budget is used for salaries, leaving little or nothing for operations. Under these conditions, it is very difficult for the Certification Division and Defensa Agropecuaria to carry out their duties effectively and efficiently.

Skills. The skills of employees below the manager (or owner) level engaged in seed production, processing, and distribution are at best rudimentary. Little or no training has been undertaken at this level within the industry. Such low skills affects seed quality, as well as the industry performance.

Foreign exchange savings. The seed industry was a net foreign exchange earner during the 1960's and 70's. During the 1980's, the situation changed and the seed industry ceased to be a foreign exchange earner. Today, the situation has reversed. The pressure to import new hybrids as well as hybrids of new grain varieties (red sorghum) has made the industry a net foreign exchange loser. This is not necessarily bad in that the imported seeds save a multiple of its worth through the reduction of feed grain imports such as yellow corn, creates employment in the rural areas, increases demand for transport, etc.

Rather the point is that the seed industry in El Salvador lost its leadership position in the region, and the foreign exchange earning capacity which was an important component of the industry was also lost.

Equity. The structure and conduct of the seed industry has generated inequalities within the system. First, the collusive agreements to control seed production and prices has created "rents" to that market level while at the same time reducing overall efficiency of the system. Second, the concentration of producers by type of grain and at the processing level constrains market forces from introducing healthy competition into the industry, again creating rents for those few producers and processors.

The existing certification law and corn regulations are highly discriminatory against new entrants into the industry, discouraging participation, and again creating rents for those inside (see Section III).

Environmental considerations. The section of the seed law dealing with decommissioned seed has been violated by the very body assigned to uphold it. The practice of releasing treated seed for animal consumption, even when washed should be stopped immediately.

This well intentioned act has the potential to harm animal and humans which outweigh by far the temporary economic loss of a seed producer. Once such practice becomes common, human suffering will be only a matter of time. Two potential scenarios will suffice, namely when the supposedly safe chemicals used to treat seeds are changed and nobody pays attention, or when the washing of the supposedly safe chemicals being used today is not done correctly and humans eat the corn instead of animals.

TABLE 1

FUNCTIONAL RELATIONSHIPS IN VALUE TERMS

Variable Input (X1)	Total Value Product (TVP)	Average Value Product (AVP)	Marginal Value Product (MVP)		Marginal Factor Cost (MFC)
0	0	0			
			7.50		5.00
10	75	7.50			
			17.00		5.00
20	245	12.25			
			19.00		5.00
30	435	14.50			
			12.50		5.00
40	560	14.00			
			8.80		5.00
50	648	12.96			
			6.20		5.00
60	710	11.83		MVP=MFC	
			4.30		5.00
70	753	10.76			
			2.90		5.00
80	782	9.78			
			1.80		5.00
90	800	8.89			
			1.00		5.00
100	810	8.10			
			-0.20		5.00
110	808	7.35			

Variables:

Product price ($) = 1
TVP = Total Physical Product (TPP) * Product price
AVP = TVP/X_1
MVP = Change TVP divided by change in X_1 or MPP*Price of Product
MFC = Price of X_1

Source: Agricultural Economics and Agribusiness, by Gail L. Cramer and Clarance W. Jensen, pp. 72-90.

TABLE 2

CERTIFIED SEED PRODUCTION

Crop Year	White Corn		Rice		Sorghum	
	Area (Mz)	Production (qq)	Area (Mz)	Production (qq)	Area (Mz)	Production (qq)
80-81	2,021	76,909	8		4	
81-82	1,581	65,373	77	636	94	714
82-83	2,150	79,882	315	8,700	69	1,679
83-84	1,492	66,371	445	10,785	93	1,927
84-85	992	57,172	164	7,665	59	1,194
85-86	1,204	49,880	103	6,821	132	3,365
86-87	1,327	55,400	459	14,506	165	5,433
87-88	1,199	68,485	312	12,075	229	4,919
88-89	1,425	42,211	222	8,135	94	885
89-90	1,031	41,577	194	12,469	65	2,337
90-91	935	43,612	187	11,116	60	2,755

Source: CENTA

File: SEED.WQ1

TABLE 3

CHANGES IN CONSUMER PRICE INDEX 1978 - 1990

Year	CPI - December	Annual Change (Percentage)
1978	100.00	
1979	114.84	15.9
1980	136.15	17.3
1981	152.01	14.8
1982	172.44	11.7
1983	197.87	13.1
1984	217.30	11.7
1985	286.68	22.3
1986	373.70	31.9
1987	446.96	24.9
1988	528.53	19.8
1989	652.55	23.5
1990	778.80	19.4
1991 1/	852.40	16.2

Source:
- Evaluación de la Situación al Final del Proyecto de Crédito al Sector de Reforma Agraria, Robert R. Nathan Associates, Inc. June 1988.
- Dirección Ceneral de Estadística y Censos
- Updated
- 1/ Through July 1991; annualized CPI and inflation rate

TABLE 4

NOMINAL PRODUCER PRICES FOR BASIC GRAINS 1978-1990
(Colones per Quintal)

Year	Corn	Beans	Rice	Sorghum
1978	19.39	59.15	34.11	17.49
1979	15.13	46.68	35.58	16.80
1980	17.41	73.36	30.16	19.66
1981	18.49	88.97	31.64	21.39
1982	21.35	74.10	33.00	21.58
1983	26.33	60.35	36.45	24.50
1984	25.00	63.70	33.00	21.00
1985	23.46	78.16	33.50	22.71
1986	36.50	100.00	24.80	30.00
1987	40.33	103.92	71.31	38.29
1988	36.20	235.77	61.82	39.94
1989	49.19	177.05	45.66	40.55
1990	61.44	227.33	57.34	50.37

INDICES OF REAL PRODUCER PRICES FOR BASIC GRAINS 1978-1990

Year	Corn	Beans	Rice	Sorghum
1978	100.00	100.00	100.00	100.00
1979	67.35	68.12	90.04	82.91
1980	66.04	91.23	65.04	82.68
1981	61.09	96.37	59.43	78.35
1982	63.14	71.84	55.48	70.76
1983	68.84	51.72	54.17	71.01
1984	58.51	48.87	43.90	54.49
1985	44.89	49.03	36.44	48.18
1986	52.93	47.54	20.45	48.23
1987	46.85	39.57	46.77	49.31
1988	35.32	75.42	34.29	43.21
1989	38.88	45.87	20.51	35.53
1990	40.69	49.35	21.58	36.98

Source: Evaluación de la Situación al Final del Proyecto de Crédito al Sector de Reforma Agraria, Robert R. Nathan Associates, Inc. June 1988.

Dirección General de Estadística y Censos

TABLE 5

CORN - COST OF PRODUCTION AND FARM GATE PRICES

	Colones			Index 1978 = 100		
Year	Input Cost	Production Cost	Farm Gate Price	Input Cost	Production Cost	Farm Gate Price
1978	201	807	19.39	100	100	100
1979	246	918	15.13	106	98	67
1980	353	1,176	17.41	129	107	66
1981	419	1,257	18.49	134	100	61
1982	407	1,244	21.35	116	88	63
1983	330	1,182	26.33	83	74	69
1984	419	1,432	25.00	95	81	59
1985	371	1,350	23.46	69	62	45
1986	633	1,898	36.50	89	66	53
1987	594	1,900	40.33	67	53	47
1988	600	2,189	36.20	56	51	35
1989	630	2,246	49.19	48	43	39
1990	829	2,806	61.44	53	45	49
1991	997	3,583		58	52	

BEANS - COST OF PRODUCTION AND FARM GATE PRICES

	Colones			Index 1978 = 100		
Year	Input Cost	Production Cost	Farm Gate Price	Input Cost	Production Cost	Farm Gate Price
1978	168	632	59.15	100	100	100
1979	249	829	46.68	128	113	68
1980	414	1,267	73.36	181	147	91
1981	498	1,330	88.97	190	135	66
1982	498	1,330	74.10	170	121	72
1983	487	1,318	60.35	147	106	52
1984	300	1,003	63.70	81	72	49
1985	324	1,032	78.16	72	61	49
1986	506	1,445	100.00	85	64	48
1987	443	1,336	103.92	59	48	40
1988	693	1,804	235.77	78	54	76
1989	601	1,706	177.05	55	41	46
1990	783	2,165	227.33	60	44	49
1991	746	2.929		52	54	

Source: Evaluación de la Situación al Final del Proyecto de Crédito al Sector de Reforma Agraria, Robert R. Nathan Associates, Inc. June 1988. Additional information of Dirección General de Economía Agropecuaria

TABLE 6

RICE - COST OF PRODUCTION AND FARM GATE PRICES

Year	Colones			Index 1978 = 100		
	Input Cost	Production Cost	Farm Gate Price	Input Cost	Production Cost	Farm Gate Price
1978	302	1,135	34.11	100	100	100
1979	426	1,286	35.58	123	98	90
1980	611	1,665	30.16	149	108	65
1981	712	1,793	31.64	151	101	59
1982	680	1,756	33.00	129	89	55
1983	532	1,640	36.45	89	73	54
1984	495	1,588	33.00	74	63	44
1985	552	1,684	33.50	68	55	36
1986	1,141	2,844	24.80	106	70	20
1987	953	2,632	71.31	71	52	47
1988	1,019	3,002	61.82	64	50	34
1989	1,199	3,461	45.66	61	47	21
1990	1,420	4,025	57.34	60	46	22
1991	1,774	5,219		69	54	

SORGHUM - COST OF PRODUCTION AND FARM GATE PRICES

Year	Colones			Index 1978 = 100		
	Input Cost	Production Cost	Farm Gate Price	Input Cost	Production Cost	Farm Gate Price
1978	92	575	17.49	100	100	100
1979	140	664	16.80	131	100	83
1980	170	696	19.66	136	89	83
1981	290	1,138	21.39	202	127	78
1982	282	1,129	21.58	176	113	71
1983	281	1,144	24.50	155	101	71
1984	249	1,233	21.00	123	97	54
1985	283	1,304	22.71	114	84	48
1986	483	1,742	30.00	148	85	48
1987			38.29			49
1988			39.94			43
1989	325	1,210	40.55	58	32	36
1990	260	1,247	50.37	36	28	37
1991	307	1,681		39	34	

Source: Evaluación de la Situación al Final del Proyecto de Crédito al Sector de Reforma Agraria, Robert R. Nathan Associates, Inc. June 1988. Updated with information from Dirección General de Economía Agropecuaria

TABLE 7

EXCHANGE RATE PARITY RELATIONSHIPS
(Colones per Dollar)

Year	Exchange Rate	Parity Relationship	Overvaluation (Percentage)	REER Index Trade Weight
1974				1.289
1975				1.185
1976				1.188
1977				1.148
1978				1.094
1979				1.063
1980	2.50	3.21	28.2	1.000
1981	2.50	3.39	35.4	0.946
1982	na	na	na	0.937
1983	2.82	4.05	43.7	0.822
1984	2.87	4.31	50.1	0.820
1985	3.60	5.44	51.1	0.798
1986	4.96	7.09	42.9	0.805
1987	5.00	8.33	66.5	0.684
1988				0.580
1989				0.752
1990				0.705
June 1991				0.621

Source: Robert R. Nathan, page 78.
Loehr (1988) and Norton et.al. (1988)
Loehr (1991); REER = Real Effective Exchange Rate

TABLE 8

MODIFIED CORN PRODUCTION ESTIMATES

Crop Year	Reported Certified Corn Seed Production (qq)	Estimated Hybrid Corn Production (qq)	Reported "National" Corn Production (qq)	Reported Total Corn Production (qq)	Estimated Non-hybrid Corn Production (qq)
80-81	76,909	8,899,470	1,946,709	11,447,748	601,569
81-82	65,373	7,564,590	1,778,320	10,867,815	1,524,905
82-83	79,882	9,243,489	1,462,710	9,000,000	0
83-84	66,371	7,680,073	1,447,315	9,633,000	505,612
84-85	57,172	6,615,617	2,094,500	11,461,500	2,751,383
85-86	49,880	5,771,829	1,942,200	10,769,200	3,055,171
86-87	55,400	6,410,571	2,025,440	9,500,000	1,063,989
87-88	68,485	7,924,693	2,821,590	12,575,890	1,829,607
88-89	42,211	4,884,416	3,686,800	12,956,200	4,384,984
89-90	41,577	4,811,053	3,968,400	12,794,300	4,014,847
90-91	43,612	5,046,531			

Seeding rate (Lbs/Mz) = 35 Yield (qq/Mz) = 45
Unsold Seed inventory (%) = 10% File: ESTCORN.WQ1

TABLE 9

ESTIMATED REPLACEMENT DEMAND AND SEED RENEWAL RATE

Estimation Factors	Hybrid Corn	Total Corn	Improved Sorghum	Total Sorghum	Rice
Cultivated area (Mz)	231,000	402,600	29,200	170,900	22,200
Planting rate (Lbs/Mz)	33	30	19	19	240
Yield (qq/Mz)	37	32	22	12	63
Seed needs for cultivated area (qq)	76,230	120,780	5,548	32,471	53,280
Estimated replacement demand (%)	54.50%	34.50%	50.00%	8.50%	22.00%
Estimated crtfd seed demand (qq)	41,545	41,669	2,774	2,760	11,722
Area needed for crtfd s. prod. (Mz)	1,123	1,302	126	145	186
Estimated seed needs for b. s. (qq)	371	391	24	28	447
Area needed for basic seed prd.(Mz)	10	12	1	1	7
Seed needs for pre-b. s. prd. (qq)	3.30	3.66	0.21	0.28	17.61
Area needed for pre-b. s. prd. (Mz)	0.09	0.11	0.01	0.01	0.27

File: SEED-REP.PRN

TABLE 10

DISTRIBUTION OF CUSTOM CLIENTS BY PLANT

PROSELA, S.A.		SEMILLAS, S.A.	
Client	Commodity	Client	Commodity
M. Calderón 1/	H3, H5, H17 H56, H102	Semillas S.A. 1/	H3, H5, H53, Sesame
Enrique Alfaro	H3, H5, A1, S2	Hacienda Nueva Guayapa	H3, H5
Daniel portillo	H3, H5,	ACRA Lombardía	H3, H5, H53, S2
Joege Cea	H3, H5, A1, A2 A4	Hacienda Escuintla	H3, H5 A1, A2, A5
Franklin Valle	H3, A1,	Avelar Hnos. AGROCONSA, S.A. AROCONSA, S.A. Hacienda Montefresco Sr. José Infantozzi	A1, A5 B383, S541 AGROCONSA 1 H5 A4, A5, Srg. I-D

Notes: 1/ Owners of processing plants
H is corn; S is sorghum; A is rice; B is imported hybrid corn

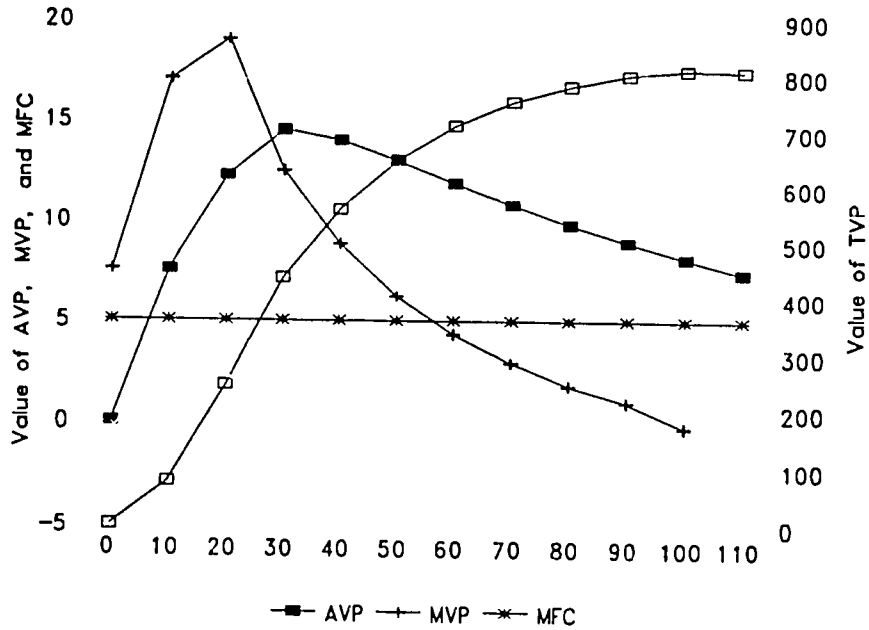
TABLE 11

AREA, VOLUME AND COST OF PRODUCTION OF HYBRID CORN SEED - 1990/91

Producer	Area (Mz)	Volume (qq)	Yield (qq/Mz)	Prdctn Cost (C/Mz)	Prdctn Cost (C/qq)	Total Prdctn Cost (C)	True Mark-up (%)
A	200	7,154	36	7,154	200	1,430,800	0.00
B	143	5,860	41	7,417	181	1,060,631	10.50
C	33	1,294	39	6,886	176	227,238	13.64
D	50	2,282	46	7,239	159	361,950	25.79
E	21	583	28	6,131	221	128,751	-9.50
F	152	6,080	40	7,384	185	1,122,368	8.11
G	137	6,000	44	7,183	164	984,071	21.95
H	33	760	23	6,912	300	228,096	-33.33
I	201	10,501	52	7,354	141	1,478,154	41.84
Total	970	40,514	42			7,022,059	

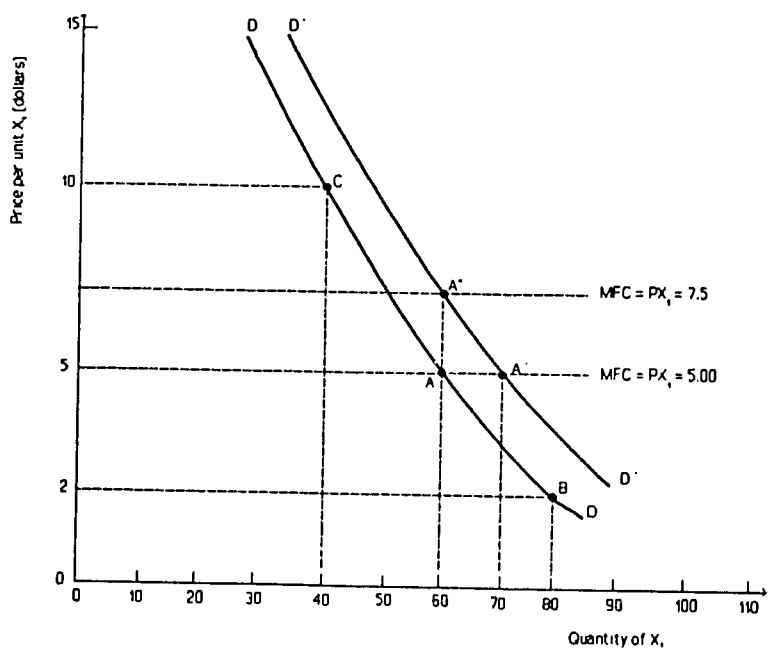
Weighted Production Cost per quintal		173.32
Net Income Margin 15%	C/qq	26.00
Minimum Sales Price to Distributor	C/qq	199.32
Rounded	C/qq	200.00
Suggested Retail Price	C/qq	225.00

Source: Comisión Nacional de Semillas



Source: Table 1

FIGURE 1. Optimum Production Level and Use of Resource X_1



Source: Agricultural Economics and Agribusiness, by Gail L. Cramer and Clarance W. Jensen, p. 86.

FIGURE 2. Hypothetical Demand Curve for Input X_1

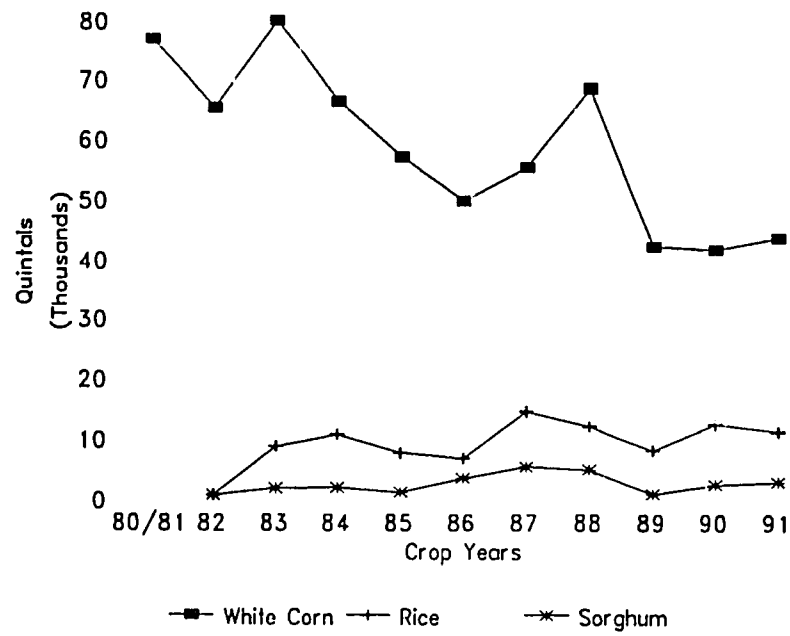


FIGURE 3. Certified Seed Production

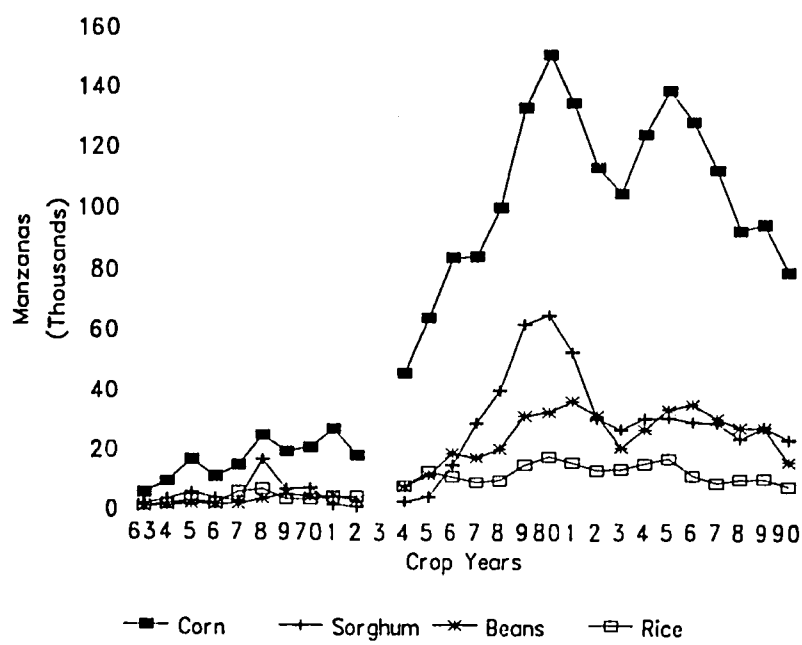
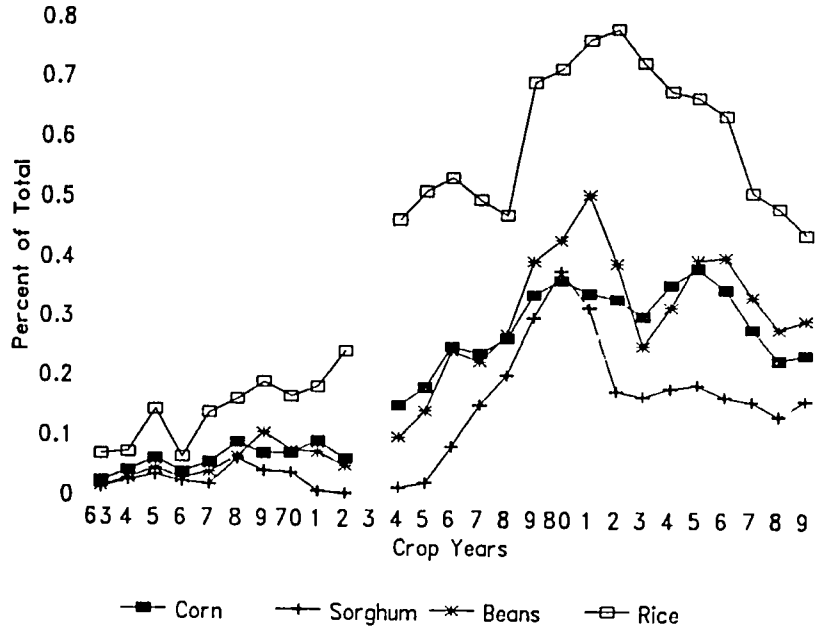


FIGURE 4. Basic Grains Area Financed by BFA 1963/64 - 1990/91 (1,000 of Manzanas)



Source: Appendix 4

FIGURE 5. Percentage of Basic Grains Area Financed by BFA 1963/64 - 1990/91

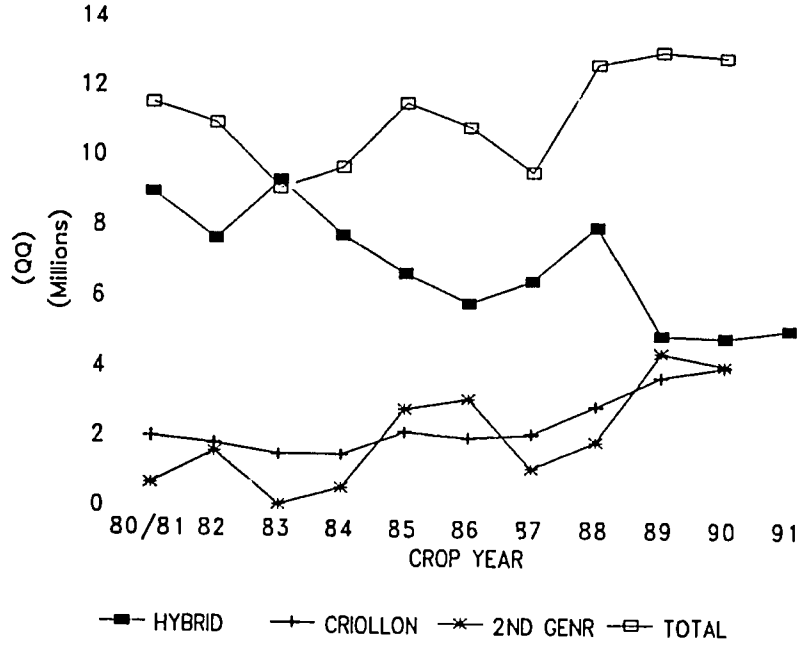


FIGURE 6. Modified Corn Production Estimates

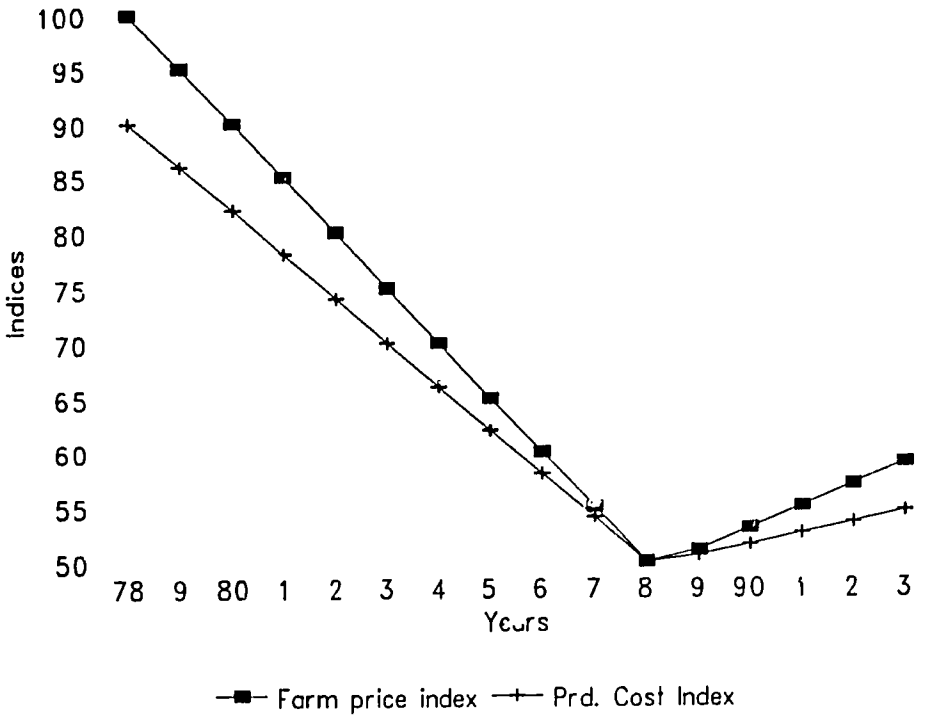


FIGURE 7. Schematic Representation of Factors Affecting the Decline and Growth in Seed Demand

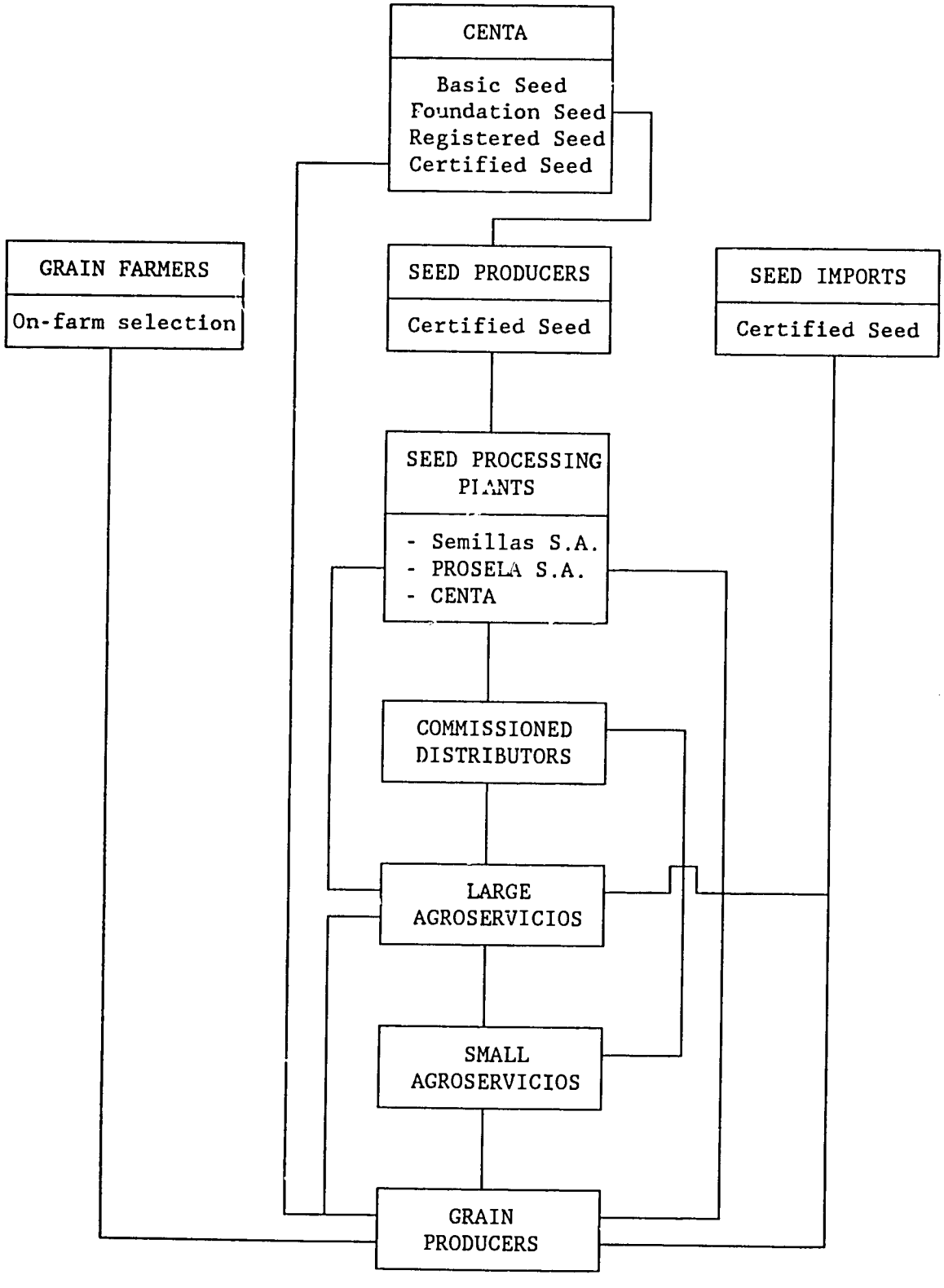


FIGURE 8. Market Structure and Channels for Seeds

SECTION III

LEGAL AND REGULATORY ENVIRONMENT OF THE SEED INDUSTRY

Framework for Sound Seed Legislation and Control

Countries with successful seed industries have, as a pre-requisite, a sound legislative framework which not only regulates, but promotes and incentivates the industry to seek higher efficiency and effectiveness levels. A basic seed legislation framework contains two components, namely:

- SANCTIONING LEGISLATION - authorizes, establishes or legally sanctions activities such as a foundation seed program, seed certification agency, and the official seed testing laboratory.
- CONTROL LEGISLATION - regulates the intra-country distribution and marketing of seed, as well as imports and exports.

Seed certification and, in some cases, foundation seed production and seed testing, must be legally sanctioned activities. Legal statutes or charters pertaining to seed certification and similar activities should be concerned only with these activities and not with seed marketing in general.

Seed control is often viewed as synonymous with certification (or *vice versa*), but ideally they are separate and distinct activities. It is well to note, however, that a few developed countries have successfully combined seed certification and seed control into one package.

Seed law and control activities basically regulate seed trade practices - the marketing of seed. Seed laws have little impact on seed usage if seed trade is non-existent, relatively minor, or is restricted to government production, distribution, and marketing.

Philosophy of Seed Legislation. Two philosophies prevail with respect to seed control:

> One philosophy is that the foremost consideration is agricultural development, and the view is that the interests of agricultural improvement are best served by excluding seed of low or uncertain quality from the market. Seed laws based on this philosophy are very broad and very restrictive. The law regulates everything from the release of varieties, through variety performance testing, to the very specific quality of seed that can be marketed. Under this philosophy, COMPULSORY CERTIFICATION IS LIKELY TO BE A FEATURE OF SUCH LAWS.
>
> Another philosophy of seed legislation is TRUTHFULNESS-IN-LABELLING. Laws under this philosophy basically require that all seed marketed be labeled for seed quality attributes specified and that the person or firm marketing the seed be identified on the tags or labels attached to each container of seed. The only standards prescribed in such laws relate to very liberal restrictions on minimum

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germination, maximum weed seed content, and validity of germination percentage on the label (test date). Strict specifications or standards are restricted to things such as prohibitions or limitations on noxious weed seed content and seed treatments which may cause injury or losses to others and not just to the farmer (consumer) who purchased the seed.

Incorporation of detailed standards, regulations, and procedures used in seed control in the body of the seed law, that is, the sanctioning legislation, is not advisable. Such matters become out-dated, and it is too difficult to return to the legislature every year or so with needed amendments. Emergency situations may develop that require suspension of certain provisions or requirements in marketing regulations.

Labeling. The most important feature of the seed law and regulations is the mandatory labeling requirement. The purpose of mandatory labeling is to require the seed vendor to identify himself and to provide the consumer of seed the important information, required by law, on the physical and biological quality of the seed he offers in the market. The information must be accurate within allowable tolerances and conspicuously displayed on a label (tag) securely attached to every container (bag) within a seed lot.

Enforcement. The seed law must apply to all lots of those kinds of seed designated as "controlled" under the law or regulations that enter into the market place. It should not matter that the seed are certified, non-certified or imported.

Ideally, the seed control agency is divided into two sections: (1) inspection/ public relations and (2) analytical or technical services. Both sections are usually under the Chief Seed Control Officer with competent assistants responsible for routine duties and operations.

The inspectors explain the provisions of the law to all persons affected, assist them with compliance, and make inspections to determine compliance. They investigate violations and execute enforcement orders and penalties.

The analytical or technical services section analyzes samples sent in by inspectors and reports results of analyses to the inspection section. It assists in investigations and advises the inspection section and Chief Control Officer on technical matters.

Identification and proof of violation and recommendation of penalties and corrective actions are the functions of the inspection section. Decisions on corrective action and assessment of penalties rests with the Chief Seed Control Officer (or courts of competence when cases are referred to them). If a mislabeled seed lot can be brought into compliance, the vendor should be permitted to re-label. Until this is done, the lot should be suspended from sale by a stop sale order. Other corrective actions and penalties available to the Seed Control Officer for enforcing the law include revocation of licenses, fines, publication of names of violators and, finally, court action.

Seed laws and seed control represent a drastic and radical change in traditions and customs in most countries. The seed inspector plays a key role in the transition period, and he must be incorruptible, unbiased, competent, and dedicated.

Review of the Regulatory Environment

The GOES has at its disposal, a number of legal institutions (faculties and agencies) to assume significant and appropriate roles in the implementation and monitoring of the Seed Law and Regulations. Technical expertise is provided by CENTA through the Research Program and the Divisions of Seed Technology and Seed Certification. Defensa Agropecuaria provides supervision of the market system to monitor performance and compliance. The División General de Economía Agropecuaria (DGEA) provides information on production and markets. The National Seed Commission studies the different aspects of production and marketing of certified seeds and integrates this information through CENTA to coordinate functions, responsibilities, and policy actions.

Seed Law. In El Salvador, the decision was made by the GOES to pursue the path of CONTROL LEGISLATION by the enactment of Decreto NO.229 in 1971 - Ley de Certificación de Semillas y Plantas.[1] This type of legislation regulates the intra-country distribution and marketing of seed and seed imports (and exports). By choosing this concept, it appears that the foremost consideration was for agricultural development, which promotes the idea that the interests of agricultural improvement are best served by excluding seed of low or uncertain quality from the market.

As a result, compulsory certification appears to be a feature of this Decreto in that it is structured as the Ley de Certificación de Semillas y Plantas. In addition, El Departamento de Incrementación y Certificación de Semillas y Plantas is given jurisdiction in enforcing the law. The opinion prevails that private enterprise either cannot or will not produce quality seeds independently without government intervention. Hence, strict government systems of control, inspection, and enforcement developed.

Since 1987, the National Seed Commission has been instrumental in guiding a public process through open seminars and workshops (5 of them to date) with the intention of improving the existing law and regulations. Following is a constructive review of the last version of the proposed new Seed Law, dated April 15, 1991.

- First, a Seed Law should be of a general nature to encompass all seed trade in the agricultural sector - NOT JUST CERTIFIED SEED. The new Seed Law - "Ley de Certificación de Semillas y Plantas" implies, like the old one, that only certified seeds are produced and marketed in the seed trade.

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[1] It should be stressed that this law is a certification law and not a seed law.

Second, certain inconsistencies and/or contradictions in the proposed law concerning certified and non-certified (all other) seeds exist, among them:

* Capitulo I, Art. 1.

  # Item (a) Garantizar la identidad genética y calidad superior de las semillas y plantas certificadas, y otras cuyo destino sea insumo agrícola.
  Comment: This implies that "others" (seeds) exist.

  # Item (b) Fomentar la producción de semillas y plantas certificadas el uso en el mercado interno y la exportación.
  Comment: This legislates only certified seeds.

  # Item (c) Diversificar e incrementar la producción agricola nacional, mediante el uso de semillas y plantas certificadas de nuevas especies.
  Comment: This limits production only to certified seeds.

* Capitulo II, Art. 3.

  # Para la formulación, coordinación y seguimiento de la política de producción y comercialización de semillas y plantas certificadas, y todas aquellas que sean para insumos ...
  Comment: "Todas aquellas" implies that there are others than certified seeds and plants.

* Capitulo III, Art. 4.

  # Item (a) Semilla: Todo grano, tubérculo, bulbo o cualquier parte viva del vegetal que se use para reproducirse.
  Comment: This admits the existence of all seeds - not only certified.

  # Item (m) Inspector: Técnico capacitado y autorizado para realizar todas las actividades de certificación y control legal.
  Comment: By this definition the inspector will perform all activities when, in fact, the seed analysts perform some tasks. Also, here it should be emphasized that the inspector will take the official sample.

  # Item (?) Analyst ...
  Comment: There is no definition for analyst. An analyst should be defined as the laboratory specialist who performs seed testing.

* Capitulo IV, Art. 5.

  # Item (g) Supervisar la adecuada colocación de etiquetas y marchamos en los envases o plantas certificadas.
  Comment: This imposes another trip to the site. Does this mean supervise or actually attach seals and tags. Why not let producer attach tags and seals? Certification will know the number of bags and therefore maintain accurate accounting of tags and seals. If, by chance, the

producer attaches tag and seal to other bags, then what disposition can be made of bags without the tag/seal?

Item (h) Aprobar los envases para la comercialización de semillas certificadas.
Comment: Certification should not have authority to approve bag design, and should only specify NEW BAGS.

Item (i) Conceder licencia de productor y/o beneficiador a las personas naturales o jurídicas que deseen dedicarse a la producción de semilla y/o plantas, ...
Comment: This makes Certification a very powerful agency.

* Capitulo V, Art. 6., Art. 7.

La semilla básica ... producida por el Ministerio de Agricultura y Ganadería es patrimonio nacional.

Para producir semilla básica ... el ESTADO dispondrá de los terrenos de su propiedad en el Ramo de Agricultura y Ganadería; ...

Comment: These do not include semilla genética, implying that the seed law does not apply to semilla genética.

* Capitulo V, Art. 11.

La semilla importada ... deberá estar certificada en la categoría ... cuyas normas no sean inferiores a las nacionales ...

Comment: If the national norms are too strict and unrealistic, such as 10% moisture, 2% inert matter, and 0% weeds, why restrict imported seeds to regulations that cannot be enforced?

* Capitulo V, Art. 12.

Para poder comercializar internamente todo lote de semilla rechazada para fines de certificación se pondrán de acuerdo el productor y el Organismo Certificador para su destino final.

Comment: If a lot is rejected, then law permits Certification and producer to decide on its disposition. This may be interpreted that seeds can be sold as non-certified.

* Capitulo VI, Art. 13. Prohibiciones

Item (a) Traficar con semillas ... cuyas especificaciones no correspondan con las que se indiquen en la etiqueta respectiva.
Comment: This appears to contradict Capitulo V, Art. 12.

Item (b) Separar, destruir y alterar en forma total o parcial, las etiquetas o marchamos de certificación.
Comment: The market demands that agroservicios separate and alter certified tags when the bags are opened for re-sale.

Item (c) Traficar con semillas ..., (cuyo) período de vencimiento haya caducado.
Comment: When certified bags are opened the certification is null and void, thus this regulation cannot be enforced.

Item (e) Traficar con semillas no certificadas, en envaces que sean aprobados exclusivamente para el expendio de semillas certificadas.

Comment: Currently, the market demands that retail sales are undertaken in small plastic bags which are not approved by certification.

Item (f) Trasegar semilla certificada de envases deteriorados a otros en buen estado, sin la autorización previa.

Comment: This regulates and goes against the needed retail sale practice of resacking 50 lbs certified bags into smaller units. The solution to this is to recognize certification in smaller bags.

Item (f) Caso de concederse dicha autorización, todo trasiego deberá realizarse en presencia de un inspector.

Comment: The marketing system contradicts this portion of the law. The inspector is not present when the certified bags are opened, nor does it seem physically possible to do so.

Item (g) Expender semillas certificadas, en envases que no sean aprobados por el Organismo Certificador.

Comment: Certification does not approve the smaller bags dictated in the market system.

Item (h) Desatender las indicaciones que emanen del Organismo Certificador, en relación al uso y manejo que debe darse a la semilla de un lote rechazado para fines de certificación.

Comment: If the lot is rejected, then certification specifies instructions for its disposition. This implies some disposition other than complete rejection.

These selected issues were identified to illustrate some of the contradictions, as well as the excessive restrictions and regulations under which the seed industry is attempting to function. A seed program should not structure initial legislation that contains internal contradictions, nor so complicated that it cannot be enforced. This leads to a lack of confidence in the seed market.

Seed Regulations. In support of the general seed law, complimentary regulations are designed to delineate more precisely the detailed plan to effectively implement and enforce the seed law. At this time only regulations dealing with corn have been officially sanctioned by the legislature. However, there are regulations pending approval for sorghum and rice.

A review of the corn regulations reveals that primarily the Division of Certification is charged with the ultimate role of control and enforcement of the regulations. Specific issues are extracted from the regulations to illustrate

the "power" of Certification and to identify the extremely detailed and restrictive control measures being used. [2]

* Capitulo IV, Titulo I, Art. 4.

  # Item 3. A defecto de estar personalmente calificado, deberá contratar a un profesional en agronomía ...

  Comment: This regulation discriminates against those producers that do not have a professional agronomist.

  # Item 4. (a) Terreno adecuado; (b) Maquinaria agrícola suficiente; (c) Equipo de beneficiado adecuado al volumen de producción; (d) Instalaciones de procesado y almacenamiento ...; (e) Si el productor no cuenta con lo anteriormente indicado, deberá presentar contratos de arrendamiento o servicios, ...

  Comment: All of these regulations discriminate against any producer entering the certification process.

  # Item 5. (a) Nombre y generales de la persona natural ...; (b) Domicilio; (c) Nombre, localización y extensión del inmueble donde efectuará el cultivo; (d) Régimen de tenencia de la tierra; (e) Facilidades del campo; (f) Facilidades de beneficiado; (g) Facilidades de procesamiento; (h) Facilidades de almacienamiento; (i) Nombre de profesional en agronomía ...

  Comment: All of these regulations discriminate against free access to the certification process.

* Capitulo IV, Titulo II, Art. 9.

  # Item 5. Secar la semilla: Para asegurar su calidad y conservación, la semilla tendrá que secarse hast un contenido de humidad no mayor de 10%.

  Comment: Without artificially heated air drying, it will be difficult to dry maize to 10%. This regulation cannot be enforced.

* Capitulo, IV, Titulo IV, Art. 13.

  # Item 2.(b) Mantener la plantación libre de malezas: ...

  Comment: A big issue is made about the presence and control of weeds when, in fact, weeds have not been identified. Therefore, control measures are difficult.

  # Item 2.(g) Muestreo de mazorcas: Previamente a la cosecha en cada lote se hará un muestreo al azar de las mazorcas producidas parar determinar su calidad promedio.

  Comment: There can be no justification for attempting to determine quality prior to harvest.

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[2] See Appendix 9 for number and type of inspections performed by the Seed Certification Division.

Item 4.(a) Beneficiar o procesar la semilla: ... para ello será necesario disponer del equipo mínimo siguiente: ...

Comment: The regulations strictly specify equipment, which in many cases, does not function. Emphasis must be on end-product quality - not on facilities.

Item 4.(c) Clasificación: La clasificación es necesaria y obligatoria...

Comment: These regulations place extreme restrictions on seed size without any justification. Actual determination of this is quite unlikely. The regulations actually permit other sizing schemes, IF approval is received.

Item 4.(d)(d.2) ... Estos envases podrán ser de 25, 50, 100 o más ...

Comment: These regulations permit bag sizes other than 50 pounds, i.e., 25 pounds. Then, why not other sizes - 1, 5, or 10 pounds.

Item 5.(a) Temporalmente ... que no pase de 60 días. (b) Almacenamiento ... periodo máximo de 90 días, ... (c) La semilla procesada ... un período máximo de ocho meses, ... (d) La semilla ... existencia al 30 de junio ..., deberá permanecer en bodega con ambiente controlado ...

Comment: These time limitations, 60 days for bulk, 90 days for bagged, and eight months after processed, not to extend past June 30 of the following year may be as much as 10 months. Numerous adverse factors may affect quality during this interval. Controlled storage should occur sooner.

Item 5.(f) Acondicionar ... el 10% de la cosecha.

Comment: This 10% reserve places producers in a difficult position, either not being able to sell their seeds or attempting to calculate the reserve in order to meet the regulations.

* Capitulo IV, Titulo V. Art. 15.

Items (a-s) Nombre comercial ..., - En caso de semilla proveniente del extranjero ...

Comment: These regulations place extreme restrictions on the importation of seeds. Such detailed requirements will jeopardize importation of seed materials which may be essential for agricultural development.

* Capitulo IV, Titulo V. Art. 21

Las instituciones autorizadas para producir ... semilla de fundación o semilla registrada ... almacenar dichas semillas en la planta ... del CENTA.

Comment: The producers have facilities to store seeds and should not be required to store them at CENTA ... where they must pay for storage they may not need.

* Capitulo V, Art. 23.

  # Item (a.2) Si en la tercera prueba ... 85% ... cada tres meses ... 80% ...
  Comment: This regulation establishes time interval for re-testing seeds. However, there is no research evidence to support this requirement.

  # Item (b) Prueba de pureza: ...
  Comment: This procedure to determine pure seed is not an acceptable technique under ISTA Rules.

* Capitulo VI, Art. 33.

  # Item (a) Los agricultores ... (b) Si aplicando ... (c) Si no hubiere ...
  Comment: These regulations place extreme restrictions on producers attempting to produce seeds for the export market. Internal shortage predictions, land allocations and limiting exports are all very difficult to coordinate.

* Capitulo VII, Art. 42.

  # Item 4. Tomar muestras de semillas ...
  Comment: This regulation authorizes inspectors to take samples when, in fact, the analysts take the samples.

Whether intentionally or by chance, the current regulations appear structured to benefit a selected few in the seed trade. Legislation and regulations requiring producers to have special land, equipment, cleaning, and storage facilities, as well as the services of a professional agronomist, as pre-requisites to being approved as a seed producer are so restrictive that only a select few can comply with them. If this continues, it will create a "closed society" of certified seed producers prohibiting market forces from making it more efficient and progressive.

This is dangerous in that it restricts access to the certification process, eliminates open competition, and strangles free seed trade. It is extremely difficult for any industry to expand under such impediments. It appears that the certification system has almost complete control of the hybrid maize production in that they allocate land for production, negotiate price, and establish regulations for this virtual monopoly. This might be acceptable if the producers were organized formally into a Certified Seed Growers Association and therefore governed themselves within the boundaries of the certification system. However, the Seed Law should permit and facilitate participation in the seed-trade by other interested and competent producers.

A critical review of the proposed draft for the new General Regulations reveals very little significant change for the better. Even though the effort may have been made with good intentions, there is little change from the old philosophy, i.e., strict regulatory actions. Of greater concern, the new regulations authorize the MAG and other public agencies to engage in the production of all categories of seeds and plants. This directly contradicts the philosophy of

public divestiture of commercial seed production. (Capitulo IV. Productores. Articulo 14. Pueden ser productores de semillas y plantas, en todas sus categorías, el Ministro de Agricultura y Ganadería, otras Instituciones Estatales, y otras personas naturales o jurídicas que cumplan con la Ley y sus reglamentos. ...

In addition, specific certification norms for the production of sorghum and rice have been drafted. In fact, seeds of both crops are currently being certified under these proposed regulations. This is quite irregular, since the regulations have not been approved. The legal and technical question remains, then, are the seeds truly certified? While these proposed regulations project a sense of good intention in developing specific regulations and norms for each crop, they are still lacking considerably in both appropriate context and enforcement techniques.

Defensa Agropecuaria. Defensa Agropecuaria (DA) is identified as one of the enforcing agencies through its role of inspecting the market outlets for seeds. Defensa Agropecuaria is charged with market surveillance to determine any "abnormalities" and/or improprieties and report these to the Division of Certification. Defensa Agropecuaria has the same authority as does Certification in that their inspectors have free access to farms, enterprises or stores (agroservicios) that sell seeds or "exhibit seeds in the process of certification".

Their primary concern appears to be reporting infractions of the Certification Law pertaining to validity of test dates on the certified seed tags. They accomplish this through unannounced inspections of the agroservicios and seed storage warehouses. If seed bags exhibit expired tags (three or four month valid test date), then the vendor or storage facility is reported to the Certification Division, who in turn enforces the law by removing the "violated" seed from the market. Defensa Agropecuaria has the authority to actually close the agroservicios.

Representatives from agroservicios were not in total agreement about the role of Defensa Agropecuaria and its effect on their marketing system. Some "thought" that Defensa Agropecuaria sampled their seed and imposed fines for violations. Others disagreed but did not provide definitive information. Only one owner of all agroservicios met had its seed inventory sampled, while supposedly Defensa Agropecuaria is sampling every time it inspects. In addition, some of the agroservicios thought that they were accountable for "mis-labeled" seeds, and that the corresponding fines were imposed on them. The producer (name on tag) should be responsible for the label. Thus, the roles of Defensa Agropecuaria and Certification are not well understood.

The Director of Defensa Agropecuaria was quite explicit in stressing that more than 90% of their budget is allocated to personnel salaries. This, of course, seriously inhibits the efficiency and effectiveness of the agency. Limited funds restrict the number and quality of inspections of the many agroservicios and other market channels.

National Seed Commission. The National Seed Commission (NSC) was created by an Executive Decree and identified as "La Comisión". Its responsibilities include

studying the different aspects of production and commercialization of certified seeds. The National Seed Commission is organized as follows:

President	-	General Director of CENTA
Secretary	-	General Director of Economía Agropecuaria
Member	-	Representative of ASPRODES
Member	-	Representative of ASPRODES

There is very little information available on the organization and function of the National Seed Commission other than its role and function, briefly defined in the proposed Seed Law. The NSC evaluates the different aspects of production and commercialization of certified seed, and integrates these through the Director General of CENTA, who is president of the Commission, the Director General of DGEA, and the representatives of ASPRODES. Nothing could be found in the Regulations or other documentation in regard to specific objectives and procedures. It appears that their agenda may be set at each meeting, depending on issues raised or "requests for action" received.

SECTION IV

THE GOES SEED PROGRAM

Review of the GOES Seed Program

General Overview. With the increased demand for improved seed, in 1969 the proposed General Law for the production of Certified Seeds and Plants was presented for approval. With a few modifications this law was approved on 10 February 1971, and the "Seed and Plant Certification Law" and was published in Official Record #33, Volume #230 dated 17 February 1971.

This law gave birth to the "Department of Multiplication and Certification of Seeds and Plants" which, at that time was an agency of the General Directorate of Agricultural Research and Extension. Today, the parent organization is the Center of Agricultural Technology (CENTA), whose functions, since its inception, are to control the production, marketing, importation and exportation of certified seeds.

More recently, the Division of Seed Technology and, as a part thereof, the Division of Certification of Seeds and Plants were created. Their functions include the auditing and control of actions within the seed industry, both in the interest of state (Division of Seed Technology of CENTA) and private business.

Further, on December 12, 1979, the Division of Seed and Plant Certification was transferred from the Division of Seed Technology to the office of the General Directorate of CENTA as an independent unit. The purpose was to "vitalize" the process of production, importation, exportation, conditioning, storage, and distribution of certified seeds. This action was designed to provide a mechanism whereby the identity and genetic purity of seeds with respect to the original material - Breeder (Genetic or Basic) and Foundation (Basic) Seed - were guaranteed by Certification.

This "accord" was approved with constructive criticism from the private producers, seed users, and several "external" specialists. Also, the experience of other Latin American countries, where the seed production industry works effectively, was taken into consideration.

This action of singling out and establishing the Certification Division as an autonomous and independent unit was designed to eliminate bias in the inspection process and prevent Certification from inspecting and certifying its own seeds (as it did when it was a section within the Division of Seed Technology).

Thus, the Division of Seed Certification remains defined as the "Technical Organization" of the MAG under the Office of the General Directorate of CENTA. It is charged with the control of production, processing, and marketing of certified seeds, and the enforcement of the Seed and Plant Certification Law and the General and Specific Rules and Certification Standards.

The organigram in Figure 9 shows the relationship among the sectoral components of the seed industry in El Salvador. The National Seed Commission assumes the

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over-all administrative position to design appropriate policy guidelines and coordinate activities and functions between the public and private sectors.

Research Program. Within CENTA, the programs for varietal improvement are located in el Departamento de Fitotecnia de la Division de Investigacion Agropecuaria. Presently, the greatest emphasis is primarily devoted to basic food crops - maize, sorghum, rice and beans.

Each of the crop-specific research programs maintain their independent staff and physical support systems. The plant breeder develops his individual breeding program with variable breeding objectives - yield improvement, disease resistance, environmental response - so that new or improved varieties and hybrids will be adaptable to specific agro-ecological zones. The rate of releases for the different research programs are summarized in Table 12.

Corn Program

The corn program consists of one program chief, nine technicians, and 15 assistants. Their primary goals are to increase yields and resistance to diseases. The program has released six white hybrids and two yellow hybrids (Table 12) in the last 30 years, beginning with the now famous H-3 in 1960. Only H-3 and H-5 have met with success, all other releases have been declined by either the seed producers or the grain producers.

Sorghum Program

In addition to the program chief, the sorghum program consists of seven technicians and four assistants. Their primary breeding emphasis is directed towards selecting photosensitive varieties for different agro-ecological zones. There are no hybrids released, and they devote their efforts to selecting for improved varieties (Table 12). Eight varieties have been released since 1972, of which three are cultivated by farmers.

Rice Program

The rice program is directed by a chief with eight technicians and one assistant. Their breeding objectives are concentrated towards improving yield and developing resistance to disease, especially *Piricularia*. They also select for plant "architecture" and adaptation (Table 12). Four varieties have been released since the first in 1980. The rice program anticipates a new release in 1993.

Bean Program

The bean program, with its chief, consists of 11 technicians and nine assistants. Their primary objective is breeding for disease resistance (Mosaic virus) which will lead to higher yields at lower costs. Of the five varieties released so far, have been well received; however, others have not (Table 12).

Division of Seed Certification. Historically, the approval of the "Seed and Plant Certification Law" of 1971 initially set the stage for legislating seed certification in El Salvador. However, in 1979, the Division of Seed and Plant Certification was set aside from the Division of Seed Technology, and it was

granted independent status as the Division of Seed and Plant Certification directly under the General Directorate of CENTA (See Figure 9).

This move, in itself, illustrated a better understanding on the part of the GOES of the role of certification in the seed industry, and crystallized their efforts to "vitalize" the production, importation, exportation, conditioning, storage, and distribution of certified seeds. This action established the Certification Division as an autonomous and independent unit capable of exercising complete impartiality in executing their duties and responsibilities. Hopefully, removing the Certification Division from the Division of Seed Technology will eliminate bias in the inspection process and prevent the Certification Division from certifying their own seeds.

Thus, the Division of Seed Certification remains as the Technical Agency of the MAG under the office of the General Directorate of CENTA. By this action, certification is given the powerful authority to "control" production, processing, and marketing of certified seeds and the "enforcement" of the Seed and Plant Certification Law, and the General and Specific Rules and Certification Standards.

To accomplish these extremely important activities and functions, the broad objectives of the Division of Seed and Plant Certification are identified as follows:

- To guarantee the use of optimum quality seed with the object of increasing the national agricultural productivity and lowering food deficits, and;
- To contribute to the technical advancement of national agriculture with the use of certified seeds.

More specific objectives are:

- To guarantee the quality and genetic identity of certified seeds and plants;
- To control the production, internal commerce, importation and exportation of certified seeds and plants;
- To coordinate with other units in promoting the use of certified seeds and plants in order to increase the national agricultural productivity, and;
- To enforce the Seed and Plant Certification Law, its General Rules and Specific Standards.

The Division of Seed and Plant Certification, organized within CENTA is convinced that the use of high quality seeds constitutes one of the production inputs with greatest multiplying effect on the economy of every agricultural business in El Salvador. This, therefore, justifies their increased emphasis and attention in obtaining new and improved crop varieties and advanced technology to support the strategic position of seed as an agricultural input.

They also believe, according to their experience and that of others, that the seed industry cannot develop satisfactorily without adequate legislation to safeguard the interest of both the seed producers and seed users from materials (seeds) which, they contend, lend themselves easily to mistakes and falsifications. The control of seed quality factors, such as seed moisture

percentage, genetic purity, and germination capacity, require special instrumentation and personnel. Since farmers do not have this expertise (or may not desire it), the essential legislation offers the user (clients) the guarantee that the seed he buys complies with standards set forth in the seed legislation. The stated intent of CENTA is that seed producers and merchants, through adequate legislation, are protected from dishonest competition and, therefore, should gain confidence in the opportunities of the market place.

The Certification Division is directed by a chief and is divided according to responsibilities. Thus, there is a records section, a field inspection section, and a laboratory/quality control section (Figure 10).

Records

One responsible person maintains records and serves as a temporary inspector when needed. Records are kept of all the inspections, including name of producer, location of production field, inspector's name, observations, and recommendations made to the producer.

Field Inspection

There are four full-time inspectors (supported by the temporary inspector from records) who supervise every phase of field production - from land selection, planting, and flowering, through harvesting and ear selection. They also inspect the conditioning plants between each producers seed.[1]

These numerous field and plant inspections are designed to supervise each producer's production techniques and to guarantee that the seed are produced according to the strict regulations of the Certification Law. The inspectors have four vehicles at their disposal. The number of field inspections varies between 8-12, and care is taken so that the producers have different inspectors for each of the inspections.[2]

Laboratory Analysis

The seed testing laboratory - Seed Certification Laboratory - is also under the direct supervision of the Certification Division. The director of the lab has a B.S. degree in Agronomy with 20 years experience. He has been trained in Costa Rica and at CIAT. There are three seed analysts who have a minimum of 12 years experience. The laboratory provides a variety of tests, either combined or individual tests for moisture content, germination, and/or purity.

The laboratory analysts take the official seed samples. After the official analysis is completed, the laboratory issues the proper tags according to the class of seed. The cost for the tags and seals is ¢0.75 per 50 pound bag or ¢1.50 for one quintal.

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[1] The inspectors have received on-the-job training supported by short course training at CIMMYT and CIAT.

[2] See Appendix 9 for field inspection program.

Division of Seed Technology. The Division of Seed Technology is organized under the auspices of the General Directorate of CENTA. The major responsibilities of this Division include multiplication of genetic seed received from the Research Division and production of commercial certified seed. Other duties include seed storage and some "level" of marketing. The organizational structure of the Division of Seed Technology is presented in Figure 11.

This Division lists a comprehensive staff of 143 which includes all positions from the Division Chief and staff to field workers, gardeners, and watchmen (See Table 13 for staff and facilities).

The Division consists primarily of a headquarters and general purpose office building, a seed processing plant, seed storage warehouses, and adjacent production fields.

Headquarters includes the office of the Division Chief and other secretarial and staff offices for conducting activities and business of the Division. Since the Division sells seeds, the headquarters, therefore, includes the essential business and accounting (records) facilities.

The conditioning plant[3] consists of those essential systems and machines to properly dry, clean, treat, and bag seed. Originally, the plant had a designed capacity of 500 qq per day (8 hours); however, the current capacity is about 150-200 qq per day. The elevators are not sized properly to convey the higher capacity and, therefore, create a "bottleneck" which reduces overall plant capacity. The plant consists of the typical equipment essential for handling and cleaning seeds.

Storage units consist of an original storage warehouse that is no longer in use due to a faulty floor and leaky roof, and a complex of four air conditioned units designed for a storage capacity of 12,000 qq each. The storage environment was designed to maintain temperature at 17° C and RH at 80% (may vary between 60-80%). Three of the units are suspect due to faulty compressors. The remaining unit is used to rotate seeds from those units that fail to function properly.

Through a recent IDB loan, four additional storage units, identical to the original four-plex, will become functional in the near future. This will add an additional 48,000 qq of conditioned storage.

Field Production

The Division has access to approximately 300 Mz for the multiplication of Foundation seed and the production of commercial certified seed. Each of the BFC Research Programs supply the Division with Breeder (Genetic) seeds (pure lines or varieties) which are subsequently multiplied to the Foundation Class (Basic), which are then sold to the private sector producers.

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[3] For an itemized list of equipment and its functional status refer to the detailed study by EMBRAPA.

The Division also plants surplus land for the production of Commercial Certified seeds which are sold to the farmer (or consumer) market. Even though this system competes with the private sector, it generates much needed funds for CENTA.

Harvesting, handling, and processing the certified and commercial seeds follows the routine sequence typically found in most seed handling schemes. The seeds are usually harvested at moisture contents (18-25%) which require additional drying. After the seeds are shelled (usually by hand), they are dried artificially, when the dryers are functional, or they are dried on the typical concrete drying floor. Their standard drying moisture is 10%.

Following drying, the seeds are cleaned with an air and screen cleaner (Clipper Super X 29-D). Although this basic and essential cleaner is 20 years old, it continues to perform fairly well. The major deficiency appears to be the screen brushes which function to keep the openings in the screen free of seeds. Also, the screens are in poor condition, and routine repair has been of little success. The air and screen cleaner performs a satisfactory task of eliminating the majority of the undesirable seeds (deformed, diseased, broken) and most of the inert matter. However, hand sorting is required to eliminate off-color seeds and the remaining diseased and/or insect-damaged seeds.

The gravity table (Oliver Model 80-H) appeared to be of little use due to the method of installation (too high with no walk-way). And, hand sorting practically negates the need of the gravity table. The Carter Day disc (1) and cylinders (2) are seldom used, since length grading is of little importance.

Storage

Storage of seeds is accomplished fairly effectively in the air conditioned storage units. Of the initial units - four separate rooms of 12,000 qq capacity each - only one seems to function adequately. To accommodate fairly safe storage, seeds may be rotated in and out of the one "safe" unit.

The storage capacity will be increased in the near future by an additional four units - 12,000 qq each - through an IDB loan. This storage capacity will provide sufficient storage for at least 60,000 qq of seed, and considerably more if the other units are repaired.

Marketing

Seed Marketing has, in the past, been a major activity of the Division. Foundation seeds are sold to producer/seedsmen who produce certified seeds for sale to the commercial market - agroservices, farmers, etc. The Division also produces commercial certified seed which they sell to the consumer market. The Division does not distribute their seeds, but rather the consumer comes to the sales office at Headquarters to purchase their seeds. The Division does not provide credit. In a continually shrinking budget, seed sales generate additional income for CENTA.

Custom Services

Custom conditioning and storage is provided to the private sector. Since the facilities of the Division are more than adequate for their internal production, both conditioning and storage services are available for private producers. The charges for conditioning have been ¢15 per quintal; however, this will be increased to ¢20 in the near future. Storage charges are ¢1 per quintal per month.

Technical Assessment of GOES Seed Program

An in-depth analysis of seed production and supply systems in El Salvador in 1973-74[4] "revealed a negligible production and usage of improved seeds of basic food crops (BFC), other than maize, by small- to medium-size farmers in the country. Thus, it was obvious that traditional farmers were not participating in technological advances achieved through varietal development and research."

Many reasons have been advanced for the low level usage of improved seeds among small- and medium-size farmers in El Salvador, but a major fact remains that there is minimal knowledge of the benefits which can be derived from the use of seeds of improved varieties. Even though national field trials and regional research institutes have demonstrated the significance of improved seeds as a necessary input to increase yields, reduce per unit costs, and enhance farmer income, efforts have, for the most part, been focused on low interest credit and use of fertilizer and pesticides.

Little attention has seriously been given to the production and marketing of seed which must be produced within the regions because of ecological adaptation and relatively low per unit profitability. The few private seed companies focus their primary efforts on the most responsive elements in the agricultural sector - essentially the large maize farmers and to a lesser extent, rice farmers. Hence, the regulated seed trade evolved primarily as a maize industry. Another aspect - improved seeds possess improved genetic make-up, but their potential may not be realized due to poor physical quality and low germination.

Research Program. The crop research programs which constitute the very basic, fundamental, and absolutely essential first component of the "seed-chain" appear to be "limping" along at best. Severe budgetary constraints and lack of facilities and equipment have reduced the effectiveness of these programs quite drastically. Since approximately 95% of their budget is allocated for salaries, little flexibility remains for support - equipment and logistics. Hence, these programs have been curtailed severely in responding to the continued and ever changing needs of the seed industry; e.g., developing new and improved varieties/hybrids for the fluid seed trade.

The individual program chiefs appear to be fairly well trained and capable of directing fundamental research activity for basic crop improvement. Remaining static in a research program, however, is not acceptable. Seed programs require

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[4] Potts, H.C., and T.H. Foster. Seed Production and Supply in Honduras. TA 74-08.

continuous review and, when necessary, change, and research within those programs must be geared to provide technology to accommodate this change. Hence, plant breeders and research personnel must simultaneously up-grade their knowledge and keep abreast of current needs and advanced technology to adequately satisfy these needs.

Each research program indicated their knowledge of specific goals and objectives for crop improvement, e.g., yield increase, pest resistance and environmental adaptability. It is not known whether each program develops its own objectives or whether coordinated program goals are planned at a higher level. The programs appear to be staffed by an adequate number of support personnel.

Of serious concern was the perceived delinquency of the research programs to develop and release improved varieties and/or hybrids in a timely manner. The issues facing the hybrid maize program appear to be quite serious. Only two hybrids have been released successfully in 30 years. Assurances that both of these hybrids (H-3 and H-5) have been improved over the years are not supported by production statistics, that is, yield increases. Furthermore, improvements would entail changes in the parents, making a name change, for all practical purposes, mandatory.

Compounding the situation, the hybrid H-3 on which the successful hybrid seed industry was developed, has just this year been deleted from CENTA's recommended list. Although still quite popular with the private producers, seed will no longer be available. The reason for this decision was not determined and even the Certification Division could not provide a plausible response. The fifth seminar given by CENTA contains some reference that H-3 failed to perform well in competitive trials at only one location - hardly reason enough to justify terminating this popular hybrid.[5]

The H-5 hybrid never gained popularity among producers due to the need for split planting of the male and female parent to ensure proper timing of pollination (nicking). In addition, the female line of hybrid H-5 (seed parent) was a poor seed producer in the first cross, although it did produce well for the commercial market.

There are concerns regarding the development and release of hybrid H-53, which is supposed to replace the H-3. In this case, the seed industry still has problems accepting the hybrid because the male and female lines have to be planted on different dates to ensure proper pollination (nicking). Private producers complained that split-planting dates created serious problems in the event of unexpected rain which could easily interrupt or delay planting of the second line.[6]

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[5] See: *The 5th Seminar on the Seed Industry in El Salvador*, San Salvador, 7 June 1991, Evaluation of the yield potential of the female single crosses of hybrids H-3, H-5, H-53, and H-56.

[6] See: *The 5th Seminar on the Seed Industry in El Salvador*, San Salvador, 7 June 1991, Experiences of seed producers with hybrid H-53.

In defense of their program, the program chief emphasized that a new hybrid, H-57, will be released next year. This hybrid does not require split-planting and it has consistently recorded high yields.

Similarly discouraging results can be found in the other research programs. For example, it was readily admitted that four or five of the bean varieties were not well accepted by farmers (See Table 12). Most of the sorghum varieties were released more than 10 years ago, the most recent being ISIAP Dorado, successfully released in 1983. No research program is contemplated for red sorghums, a variety in high demand by commercial producers. Releases of improved rice varieties have been more successful. So far all rice varieties released are being used by farmers to different degrees.

Division of Seed Certification. The Seed Certification Division is dedicated to enforcing the "Law of Certification of Seeds and Plants" to its fullest extent. They accomplish this through the authority vested to them by the MAG to "control" the production, processing, and marketing of certified seeds and to "enforce" the certification law.

A competent and well trained director has five field inspectors who are quite knowledgeable of the certification regulations and of the proper techniques for maintaining rigid quality control. The entire production process, including producer qualification and acceptance, land selection, planting, flowering and detasseling, identification of male and female rows, harvesting, ear sorting, and plant inspection, is subject to inspection. A series of inspection forms, detailing all aspects of each inspection phase, is completed for each producer (see Appendix 9). Inspections vary from a minimum of eight to a maximum of 11. Inspectors are rotated so that no one inspector will gain excessive familiarity with any one producer.

The excessive number of inspections are justified by the division, since the opinion prevails that the producers lack adequate expertise (and motivation) to adhere to certification regulations. In the absence of an effective extension service, these inspectors serve to advise the producers of insect, disease, and weed problems in addition to the essential inspection requirements.

Following field inspections, seeds are harvested and transported to the conditioning plant. Certification division inspects the approved plants between each producer's seed to ensure proper cleanliness to prevent mechanical mixtures. This is done even though there is no difference between hybrids, thus no chance for hybrid mixture. Seeds are packaged in 50 lb bags in lots of up to 200 qq (400 bag lots).

The certification division also includes the Seed Testing Laboratory which has a chief and three analysts. The Seed Lab is responsible for taking the official samples from the producers' warehouses. The analysts perform a complete analysis consisting of testing seed moisture content, purity, and germination. After determining the appropriate labeling information, tags are issued for each bag of seed.

Seed tags are valid for either three or four months, depending upon initial germination. For example, seeds which germinate 95% are re-tested after four

months, whereas seeds germinating 85% are re-tested after three months. The Certification Division stresses that this frequency of testing is justified, since tropical conditions cause rapid deterioration and a decline in germination.

When seeds decline below 80% germination, they are not qualified as certified seed, but are downgraded to mejorada. When germination declines below 70%, the seed must be removed from the market.

However, frequent testing is difficult to justify without supportive research data. Also, certification requires that all factors (moisture content, purity, and germination) be re-evaluated. Technically, the germination factor is usually the only component expected to change - not the mechanical purity. Moisture may increase gradually but not significantly when seed are dried to 10-11%, packed in multi-wall paper bags and stored in air conditioned chambers. These additional duties of Certification create excessive work loads and, no doubt, add to certification costs.

Division of Seed Technology. The Division of Seed Technology performs a variety of functions (services); hence, there is a perceived need (requirement) for a highly structured division to accommodate this variety of responsibilities - production, conditioning, storage and marketing (see Figure 11). This division is somewhat similar in structure and responsibility to the Foundation Seed organization found in most successful seed programs. That is, its primary responsibility is that of receiving the Breeder (Genetic, Basic) seed from the research division and carefully multiplying this small quantity of seed into the next generation - Foundation seed (Basic).

In doing this successfully, this division must have the essential sub-units consisting of adequate land and equipment for multiplication (some programs use contract growers), appropriate facilities for conditioning, treating and bagging, and finally, adequate storage for preserving seed quality. In addition to these technical sub-units, the Seed Technology Division also has a very detailed and extensive administrative and commercialization section.

The seed conditioning plant continues to function in the mode in which it was initially designed. The ultimate objective, of course, is to clean and bag hybrid maize (and other seeds) to acceptable standards set forth in the certification regulations. Although the equipment in the plant is quite old, (20-25 years) it still functions fairly well to accommodate the level of production of the division. And, when the equipment fails (which it does) abundant (and inexpensive) hand labor substitutes effectively.

The efficiency of the basic air and screen machine (Super X 29-D) can be improved with the replacement of screen brushes and addition of a wider selection of screens. Otherwise, this machine functions fairly well. The Oliver Model 80 Gravity Table is of little use due to the method of installation. It is too high from the floor to observe and properly adjust its operation, and space does not permit a safety walk-way. The need for gravity separation has been replaced by hand labor.

Major, and costly, repairs and/or equipment replacement includes the need for a corn sheller, re-sizing elevators, and repairing auxiliary seed drying equipment.

The corn sheller might be replaced by the portable type driven by tractor PTO; however, the driers require either burner repair or replacement. The auxiliary drier provided by CIMMYT does not function due to lack of complete components and/or adequate understanding of installation details. The under-sized elevators, which are the real "bottleneck" in limiting capacity, must be completely replaced if capacity is to be significantly increased (or increase working hours).

It is advisable to point out that if hybrid seed production increases (also other crops) and private producers utilize these facilities as an alternative custom conditioning site, then attention must be given to up-grading this facility to handle the increase. Presently, the unit can handle only 150-200 qq per eight hour day. Thus, if production increases, then capacity must likewise be increased or longer working hours must be maintained.

The storage section is truly impressive, especially the capacity. However, typical problems which, unfortunately, seem to be commonplace with these installations, continue to plague this section. Of the initial storage phase consisting of four units of 12,000 qq capacity each, only one seems to function properly. Leaky roofs, broken floors, and malfunctioning climate control units (compressors) are identified as problem areas.

With few exceptions, the Seed Technology Division is more or less maintaining the *status quo*. Routine maintenance, repair, and upkeep has been difficult in light of budget constraints. The staff can be commended for even maintaining the *status quo* in view of this. However, if policy decisions are successful in "re-vitalizing" the seed industry in El Salvador, then this critical Division will require much needed support to bring its facilities up to date to meet the challenge.

TABLE 12

HYBRIDS AND IMPROVED VARIETIES RELEASED BY THE CROP RESEARCH PROGRAMS

Maize		Sorghum		Rice		Beans	
Hybrid	Year	Variety	Year	Variety	Year	Variety	Year
**H-3	1960	CENTA S-1	1972	*CENTA A-1	1980	- CENTA Cristal	1982
*H-5	1063	*CENTA S-2	1976			CENTA Tasumal	1982
*#H-9	1982	CENTA S-3	1978	*CENTA A-2	1981	* CENTA Izalco	1982
-#H-17	1987	CENTA SH 500	1978	*CENTA A-4	1988	- CENTA Jivoa	1987
*#H-53	1989	CENTA SH 501	1979	*CENTA A-5	1990	* CENTA Cuscatleco	1990
H-56	1990	*SS 41	1980				
|H-102	1987	San Miguel 1	1982				
|H-104	1990	*Isiap Dorado	1983				

Notes:

** Deleted.
* Varieties actually cultivated by farmers.
- Varieties not well accept by farmers.
| Yellow corn
Varieties difficult to produce as seed.

Source: Maize, sorghum, rice, and bean research programs - CENTA.

TABLE 13

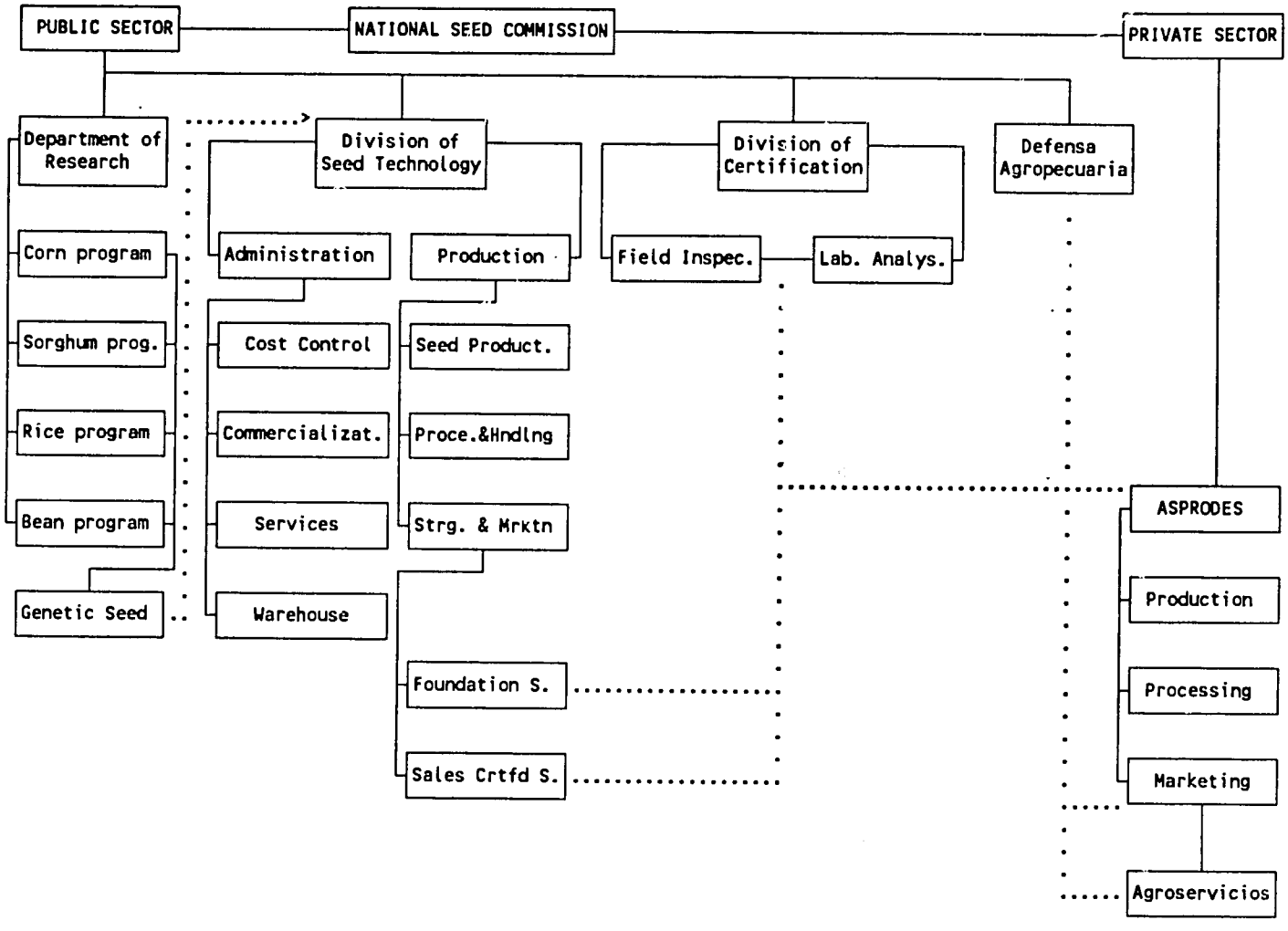
HUMAN RESOURCES OF THE DIVISION OF SEED TECHNOLOGY

UNIT	PERSONNEL	NUMBER	TRAINING
Headquarters	Director	1	B.S. Agronomist
	Secretary	1	
	Orderly	1	
Administration	Director	1	M.B.A.
	Secretary	1	
	Computer Technician	1	
	Orderlies	2	
Accounts Payable	Agronomy Student	1	B.S.
	Students	2	B.S. (business)
		1	B.A. (academic)
	Accountant	1	
Collection	Collector	1	B.A. (administration)
	Assistant	1	B.A. (business)
Production	Director	1	Agronomist M.S.
	Secretary	1	
	Agronomists	3	B.S.
		5	(Secondary)
Processing Plant	Electrical	1	B.S.
	Operators	6	(6th - 9th grades)
	Orderlies	2	
Storage	Manager	1	(9th)
	Assistant Manager	1	(6th)
	Secretary	1	
	Orderly	1	(5th)
	Eng. Kardex/whse	1	(9th)
Sales	Agronomist	1	B.S. Dept. Head
	Assistant	1	B.A.
Tractor Drivers	Foreman	1	(5th)
	Drivers	4	(2nd - 6th)
Truck Drivers	Drivers	4	(6th - 9th)
Warehouse	Manager	1	B.A.
	Assistant	1	(9th)
Gardeners	Gardeners	2	(1st)
Watchmen	Watchmen	15	(2nd - 6th)
Field Leaders	Supervisor	1	(5th)
	Foremen	9	(6th - 9th)
Field Workers	Men	41	
	Women	20	
	Grafters	3	

TABLE 14

PHYSICAL RESOURCES OF THE DIVISION OF SEED TECHNOLOGY

Equipment	Number	Condition/Status
Trucks	3	1 good
		1 fair
		1 poor
Troopers	2	2 good
Pick-up	2	1 good
		1 poor
Jeeps	3	1 good
		2 poor
Motorcycles	9	5 good
		4 poor



File: DIAGRAM

FIGURE 9. PERSPECTIVE OF THE ROLE AND FUNCTIONS OF THE COMPONENTS OF THE SEED INDUSTRY IN EL SALVADOR

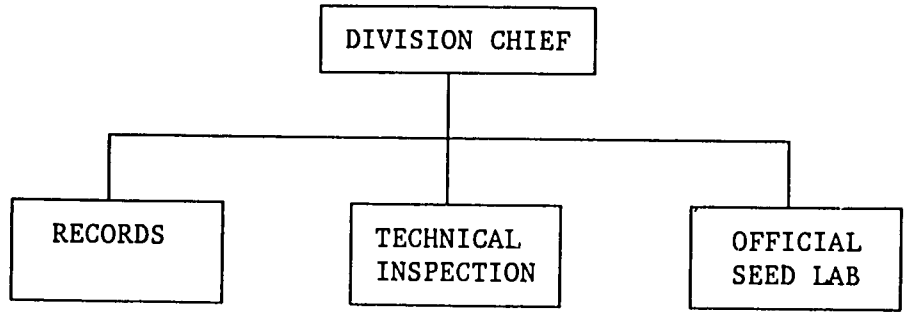


FIGURE 10. ORGANIZATION OF THE DIVISION OF SEED CERTIFICATION

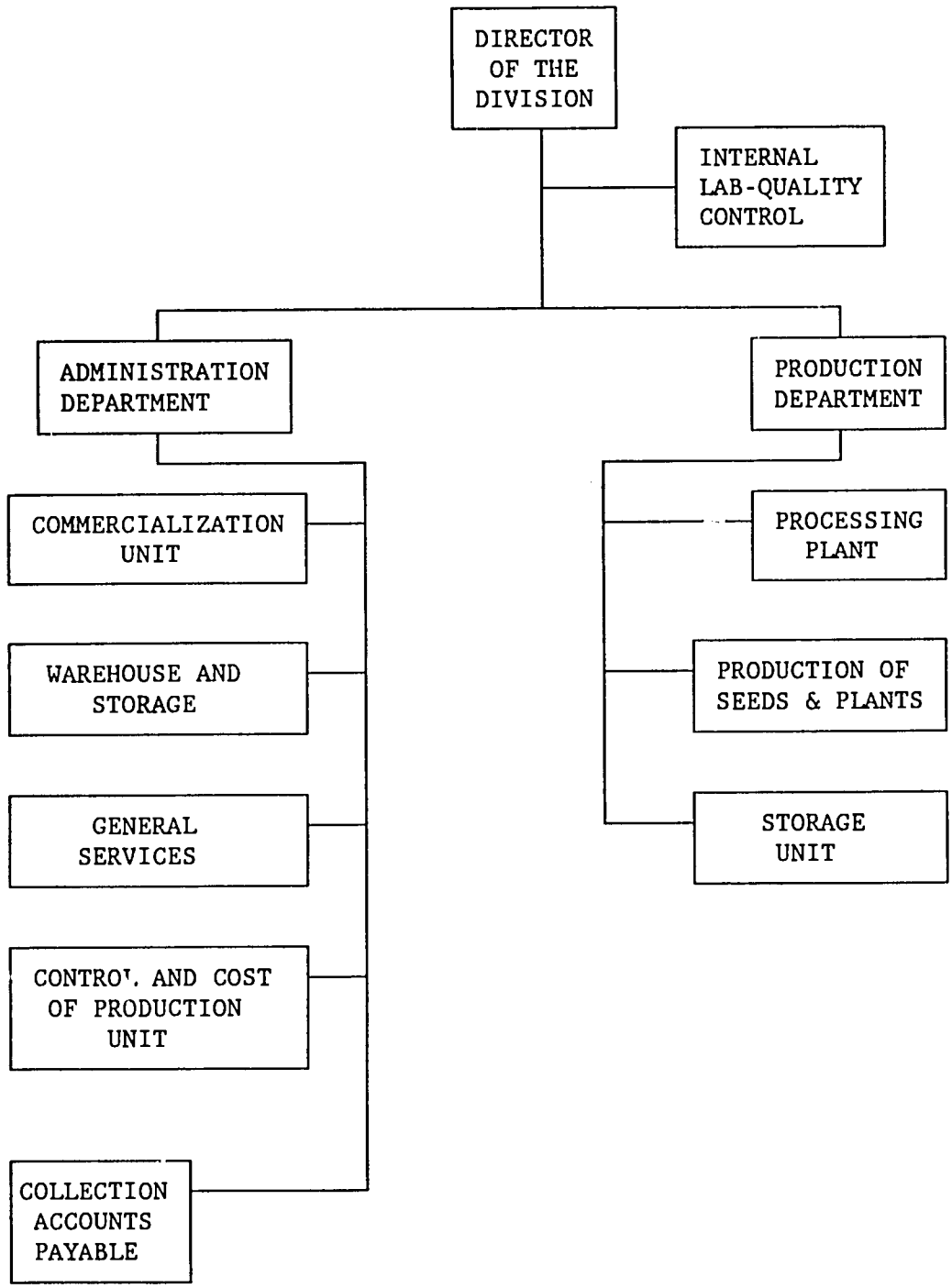


FIGURE 11. DIVISION OF TECHNOLOGY OF SEEDS AND PLANTS

SECTION V

CONCLUSIONS AND RECOMMENDATIONS

The seed program/industry in El Salvador is facing some very critical policy decisions and issues if a viable and productive seed trade is to be maintained in the country. After experiencing two decades of phenomenal growth, seed activity has declined in recent years such that radical changes are advisable in order to re-activate the industry. Enthusiasm appears dampened, little initiative is evident, and many components of the program are struggling to survive. Even the status quo will be difficult to maintain without appropriate intervention.

On the brighter side, it can be pointed out that the Salvadoran seed sub-sector does, in fact, have the fundamental elements in place including basic legal foundation, infrastructure, and skills. The major task now is to design an effective overall policy, install a sound and progressive legal and regulatory framework, assign appropriate sectoral roles, and establish effective coordination and communication among the significant components.

Conclusions

On the Decline of the Seed Industry. The demand for certified and improved seeds has declined mostly as a result of changes in factors which were beyond the control of the participants within this sub-sector. These factors reduced the real prices for grains and the net real margin obtained by grain producers. As the VMP of seed declined so did demand. These factors include:

- high inflation rates, resulting in declining real farm gate prices
- overvalued exchange rate, favoring grain imports
- lower international prices, favoring grain imports
- trade related regulations, favoring imported grains
- the agrarian reform; a pivotal point in 1980

Other factors which contributed to the decline, but which are within the control of the financial and the agricultural sectors, as well as the seed sub-sector, include:

- a controlling rather than facilitating legal and regulatory environment,
- lack of trust by the public sector in the forces of the market,
- lack of trust by the private sector in the performance of the public sector,
- reorientation of the extension service from 1980 onwards,
- severed linkages between research and technology transfer,
- loss of export markets,
- the loss of BFA as the major outlet for certified seed under its scheme of providing credit in kind to small and marginal producers,
- lack of un-timely and arbitrarily set production credit,
- lack of new, higher yielding varieties,
- lack of competition in seed production,

- lack of aggressiveness in seed merchandising,
- slow adaptation and/or adoption of technologies,
- lack of information and little or no use for supply and demand analysis,
- lack or improper enforcement of regulations,
- subsidized public production and sales of certified seeds.

On the Outlook. A revival of the seed industry in El Salvador will ultimately depend on the continued success of on-going and future adjustments to macro and trade policies, as well as structural and sectorial reforms. Assuming continued success, and continued positive impacts at the farm level, the demand for commercially produced seeds should experience gradual annual increases during the next decade.

Under this scenario the potential demand for certified basic grains seed could approximate the following:[1]

- Hybrid corn only : 50,000 qq, with a replacement rate of 66% or every 1.5 years
- Total corn : 72,000 qq with a replacement rate of 60% or every 1.6 years
- Total sorghum : 16,000 qq with a replacement rate of 50% or every 2 years
- Rice : 21,000 qq with a replacement rate of 40% or every 2.5 years

On the Structure, Conduct and Performance of the Seed Industry. The conclusions on the structure, conduct, and performance of the seed industry are mixed. Depending on the marketing level in question, the structure and conduct of the seed industry result in efficient and effective levels of performances, to unacceptable levels. Major performance conclusions are summarized below:

- The current structure and conduct of the seed industry is relatively effective in supplying commercial seed to grain producers. That is, most farmers who are willing and able to buy certified seeds have access to supply at the right time and form.
- The current structure and conduct of the seed industry entails a relatively high level of inefficiency at the producer/processor level mainly due to (1) a controlling rather than facilitating legal and regulatory environment (2) the existing barriers to entry at that level, (3) a high level of concentration in the industry at the producer/processing level, and (4) the well-intentioned but counter-productive process to control supply and prices of certified seeds.
- The current structure and conduct of the seed industry shows a relatively high level of efficiency at the wholesale/retail level

[1] Based on 1989/90 cultivated area; total corn and sorghum assumes that farmers can be convinced of the economic and technical benefit of abandoning criollo varieties of both crops.

mainly due to the large number and the conduct of agroservicios distributed throughout the country.

On the Regulatory Environment. The regulatory environment is an integrated system consisting of the legislative aspects (seed law) and the regulatory enforcement aspects (certification and defensa agropecuaria). It is this vital component of the seed industry which is considered most outdated and in great need of change.

The Seed Law

- The existing seed law is a seed certification law designed strictly for the certified hybrid corn seed industry. It was designed almost entirely around the hybrid corn "single-crop" seed industry. It has created a highly legislated and regulated industry functioning totally within a certification system decreed by the law.
- This "law" does not provide legislation for a comprehensive seed program which is essential if seeds of other crops, e.g., sorghum and rice, are to be regulated in production and marketing schemes.
- The "law" contains entirely too many specific details, which tend to over-regulate and control the industry, and does not provide adequate guidance and flexibility to facilitate and promote expansion and utility of hybrid corn and other seeds as they may be included in the program.
- The seed certification law has internal contradictions making its interpretation rather difficult and its equitable implementation questionable.
- A new seed law is under consideration. As proposed, it is still a seed certification law and not a seed law. It contains much of the wording and philosophy of the historical law. It is extremely restrictive and detailed and still provides for an "over-regulated" seed industry. It contains many of the contradictions contained in the original law.

The Regulations

- While attempting to provide a positive framework and atmosphere under which seeds are produced and marketed, the specific regulations and norms have been so tightly structured that realistic enforcement is almost impossible. Rather than "regulating" the seed industry, they include details to follow throughout the comprehensive system of production, harvesting, conditioning, storage, and marketing seeds. While such details are essential in training (extension) programs, they are not appropriate in regulatory and enforcement activities.
- The regulations are highly discriminatory and provide protection for those already within the seed industry. They are extremely ineffective and non-applicable to seeds other than maize, even though some attempt has been made to apply the hybrid maize regulations to production techniques in other crops, especially sorghum. This is not a valid approach.

- There is no significant change in philosophy between the proposed general regulations and the existing ones. In fact, the disturbing evidence is that the proposed regulations permit the MAG and other public agencies to engage in the production of all categories of certified seed.
- The new draft regulations for rice and sorghum show very little promise to be any more effective than those designed for maize. Although somewhat less specific and restrictive, they fail to provide a framework in which a successful program can function.

Defensa Agropecuaria

- As an enforcement agency at the market level, Defensa Agropecuaria, through its regional offices, inspects seed activities of the agroservicios. They report abnormalities and regulation infractions to the Division of Seed Certification, who in turn, imposes appropriate penalties.
- Defensa Agropecuaria could better serve the overall seed trade with a more defined area of responsibility to compliment (not duplicate) the activities of the Certification Division.
- A note of extreme caution is advisable about treated seeds. The practice exists in El Salvador where treated seeds declining below 70% (not accepted as certified seed) can be "washed" and then fed to livestock (and possibly to humans). This practice is extremely dangerous. Treated seed should be destroyed - even the Seed Certification Law strictly prohibits use of treated seeds. It specifies destruction by incineration or burying.
- Defensa Agropecuaria is attempting to conduct regulatory activities under a severe budget constraint - 90% for salaries. Increases in fees for regulatory services - licenses, sampling - will provide much needed funds to increase agency effectiveness

National Seed Commission

- The National Seed Commission, composed of one person from CENTA, one from Economía Agropecuaria, and two from among the registered producers, does not have equitable representation from all sectors involved with seeds. This leads to decisions favoring small areas of the industry.
- Even though the purpose of the commission is loosely defined, there are no real, stated objectives.
- The decision by the National Seed Commission to eliminate hybrid H-3 was arbitrary and not based on market research data. The country is left with only one tested corn hybrid and a number of failed releases.

On the GOES Seed Program.

The Research Program

- The research programs urgently need to critically review their complete structure, re-direct their breeding objectives and tune a "listening ear" to market (producer) demands.
- Not only must the research programs assume leadership in developing new varieties/hybrids for a discriminating market, but they must also develop complimentary recommendations maximizing potential production -planting density, dates, fertility response-reactions, and other needed production inputs.
- Productive research programs are absolutely essential for "invigorating" and maintaining a viable seed trade/industry. The continual input of new and improved varieties and hybrids creates consumer "excitement" and consequently promotes increased market demand. Otherwise the seed trade/industry gradually slows down, finally becoming stagnant and then, beware, foreign seed sources will eventually prevail.
- There is an urgent need for development and release of new and/or improved varieties/hybrids to the seed industry. If this is not possible within CENTA, then Regional Institutions (CIMMYT) should be contacted to obtain new seed material.

Division of Seed Technology

- The extensive commercialization structure of this division is hardly justified at this stage. It was instituted during the initial phase of organization when a major responsibility of CENTA included further production of commercial certified seed which was (and continues to a degree) sold to the ultimate farmer/consumer. This system, of course, generated much needed funds for the general budget of CENTA. It now competes with private enterprise.
- The seed conditioning section is adequate to handle the seed output of the research program. Although the section requires considerable hand labor in support of defective equipment, the bagged seed continues to meet specific standards. Increased capacity created by expanded private use will dictate special attention to repair and/or replacement of defective components.
- Considering the amount of storage space available compared to the storage needs, it seemed quite surprising that additional storage (another 48,000 qq) is under construction, financed by an IDB loan. This might mean that the original space will be abandoned due to faulty performance and lack of funds to repair the units. This appears to be a rather "luxurious" approach to solving a lingering problem. However, if seed demand increases and the private sector takes advantage of these facilities, then the investment may prove to be a wise move.

Division of Seed Certification

- The Division of Seed Certification has emerged as probably the most powerful agency in the seed industry. By GOES decree it controls and regulates the seed trade through its inspection and laboratory system.
- Although this division maintains strict control of the small hybrid corn seed industry, it lacks qualified staff, essential equipment, and financial support to increase its activities to meet the demands of an expanding seed industry.
- The Division, because of the vital support it provides to the industry, should be financed, to the extent possible, from fees assessed for the certification service.
- There exists little confidence in the private sector to accomplish all tasks of the certification/production process; hence, the perceived need for strict control and enforcement.
- Certification is an obligatory scheme and not a voluntary system. Duplication of activities and non-essential tasks creates a strain on personnel and reduces efficiency.

Recommendations

A comprehensive set of action recommendations have been developed to cover all relevant aspects of the seed industry, including (1) seed legislation and regulation, (2) the GOES seed research program, (3) seed production and market information, (4) seed production and processing, (5) seed marketing, and (6) extension services.

First, this programmatic approach to invigorating the seed industry implies that half-measures, or the implementation of some but not of others will not lead to the desired results. Second, even if executed in their entirety, these recommendations will be in vain if relevant macro prices (inflation, exchange rate, interest rates, border prices for grains and beans) as well as relevant sectoral and trade frameworks are not kept within appropriate bounds. In other words, the success of all these action recommendations is contingent upon continued success at a more fundamental level, i.e. the macro-economic and sectoral levels where impacts affecting farmers' decisions are generated.

Legislation and Regulation. The very fundamental and basic elements of any seed program, legislation and regulation, frequently determine the degree of success or failure the program achieves. A good comprehensive seed law, while addressing all aspects of the overall seed trade, need not be detailed to the point of becoming a restrictive tool. In other words, the law permits seeds to be sold within certain regulatory boundaries - then the more specific regulations determine precise standards.

SPECIFIC RECOMMENDATIONS

- The GOES should sponsor a comprehensive enabling seed law that identifies the need for control and regulation of the seed industry in a facilitating manner.
- Define the specific intent of the law and the specific areas in which the government chooses to exercise its authority.

- Establish the authority of the government to regulate and control the industry.
- Establish a seed control agency and mandate it to develop and adopt appropriate and commodity specific rules and regulations for carrying out the intent of the legislation.
- Redraft the existing corn regulations to make them progressive and facilitating in nature.
- The draft regulations for sorghum and rice seeds must be reviewed and edited by the appropriate agency(ies) so as to become legal documents, facilitating documents.
- The National Seed Commission must develop procedures to either approve and/or eliminate varieties and hybrids from the seed program. These decisions must be based on sound market signals and must not be made arbitrarily.
- Disengage the MAG and other public agencies from producing commercial certified seed in competition with private enterprise.
- Within the seed control agency, consider the alternative of establishing both inspection activities and laboratory services.
- If Defensa Agropecuaria is the control agency, they must develop expertise in regulatory control.
- Defensa Agropecuaria should take official samples from the seed trade for truth-in-labeling enforcement. In addition, they should sample the re-sacked seeds to determine the degree and extent of adulteration, if any. This will provide a realistic view of market self-regulation.

The National Seed Commission, representing both private and public interests should be appointed by the minister to draft standards, regulations and procedures needed for implementing a new seed law. However, for this commission to play a significant and balanced role in the development of a sound seed program, it must be composed of appropriate representation from existing agencies who have a vested interest, responsibility and dedication to the advancement and development of all elements of the seed program. Therefore, the commission should have the additional representation of (1) agroservicios, (2) grain producers, (3) grain consumers, and (4) defensa agropecuaria.

The commission should give special attention to the proper organization and assignment of appropriate sectoral roles in the seed program. It should not assume restrictive functions but should provide coordinating, promotional, and facilitating activities. Extreme care must be taken so that the structure of the Commission does not create a conflict of interest and an antagonistic atmosphere which inhibits proper operation.

The Commission does not require an elaborate infrastructure of facilities, staff, and logistics. This approach merely imposes yet another burden on the program already strained for support.

Experience from other countries reveals the following observations:

- If a minister is a member of this commission, meetings are not held as frequently as needed - or various subordinates substitute for him,

- The chairperson (executive secretary) should be very informed and interested in the seed program. Frequently, the most suitable person is the Director of Seed Certification,
- Commission meetings are more productive when scheduled regularly in the setting of the seed certification service.

The commission must be designated and identified as an "over-sight" commission with responsibilities to guide, coordinate and promote the overall seed program. Frequently, it is advisable for the commission to receive input (advice) and recommendations from a technical committee who are knowledgeable in specific areas or components of the seed program. (If the commission has adequate and appropriate representation, then a technical committee is not needed.)

The commission should design policy and provide appropriate guidance and direction to both the public and private sectors. It will also assume the role of arbitration in cases of dispute and legal matters. Specific functions of the commission, with assistance from technical committees, will include (but may not be limited to):

- Design policy and establish protocols with respect to activities in the public and private sectors,
- Establish standards and criteria for interpretation and enforcement of the seed law,
- Define standards and procedures to be used by seed certification,
- Propose guidelines and standards for the Seed Certification Service,
- Approve and accept varieties/hybrids to be included in the seed program (certification),
- Mediate conflicts that may arise among different components of the seed program,
- Determine technical assistance and training needs,
- Disseminate appropriate publications which list hybrids/varieties with proper descriptions,
- Promote education and training of appropriate personnel in the seed program.

Properly structured and activated, the National Seed Commission will provide vital advice and coordination to a developing seed program and will play a significant role in establishing secure and effective participation of both public and private sectors.

Those participants who will play an active role in revising the seed law in El Salvador to create a more favorable atmosphere for the growth and expansion of a successful seed industry may desire to review the publication - *Legislación de Semillas*. Organización de las Naciones Unidas para la Agricultura y la Alimentación. Roma, 1979. Estudio Legislativo No. 16, 2ª Edición.

Another excellent reference was developed in Bolivia by Garay, Patty, Landivar, and Rosales. This working document No.57 "Setting a Seed Industry in Motion: A Non-conventional Successful Approach in Developing Countries" contains excellent models and examples where the integrated system consists of both small and large enterprises in the public and private sectors.

A review of seed laws of other Latin American countries reveals a significant similarity; most of the successful laws are written to include all seeds, not just certified seeds; examples:

- Costa Rica: Reglamento a la Ley de Semillas
- Panama: Comite Nacional de Semillas y se Regula la Producción, Procesamiento y Comercialización de Semillas
- Brazil: Legislacáo da Inspecáo e Fiscalizacáo da Producáo e do Comercio de Sementes e Mudas
- Chile: Ley de Semillas

Research Program. New and improved varieties and hybrids provide the essential foundation upon which viable and successful seed programs are developed. Without the infusion of "NEW MATERIAL" into the program, it becomes stagnant and non-responsive to agricultural needs. The Research Programs are in dire need of urgent assistance. Under the constraints facing these programs, they are struggling to make any significant contribution. Varietal and hybrid releases are slow in emerging from the programs and frequently these are not well accepted by the producers and farmers.

SPECIFIC RECOMMENDATIONS

- Provide incentives for development and release of improved (and acceptable) varieties and hybrids, i.e., naming of releases, special recognition plaques, etc.
- Financial support is desperately needed to improve and up-grade facilities and equipment.
- Solicit input from CIMMYT for improved seed material.
- Provide training experiences at CIMMYT and/or CIAT. Another source of training is Escuela Agrícola Panamericana (EAP), Zamorano, Honduras.
- Improve breeding techniques to coincide with modern breeding objectives. This should be available at CIMMYT.
- In-country trials by PCCMCA should be recognized as official trials in evaluating variety and hybrid performance.

Division of Seed Certification. This Division has a complement of knowledgeable and dedicated staff. The department chief has many years of experience and is fully aware of the problems and limitations of the certification system. The inspectors are quite enthusiastic and willing to make personal sacrifice in order to conduct their responsibilities. The laboratory is well equipped and capable of performing their assigned tasks. Even though the length and level of personnel training is quite good, new and up-dated methods and techniques require additional skills.

SPECIFIC RECOMMENDATIONS

Field Inspection

- Coordination of inspection trips and elimination of unnecessary trips will prove to be more economical.

- Critically review the requirement of re-testing every three or four months to maintain a valid Certification Tag.
- Develop research data to support re-test interval by monitoring seed in various storage conditions.
- Certification inspectors should take the official seed sample. They are already on site inspecting the processing plant.
- Eliminate the year of production on the Certification Tag - the germination test date is the technically critical date.
- Eliminate performing a complete test on the "re-test" sample. Only germination is necessary; the physical purity remains unchanged.
- Certification should not be the enforcement agency. This requires more time and budget, and a higher authority should assume the role of enforcement.
- Consider a scheme of voluntary certification rather than compulsory.
- Certification should not assume the role of Extension, another added responsibility. However, in the absence of Extension, some "service" advice may be required.
- Make recommendations and justification to higher authority if certification regulations need changing. For example, number of field inspections, dates for re-test (if just arbitrary).
- Address issue of bag size as a certification unit. Consider smaller bag sizes to accommodate 20-30% of the commercial market. The Certification Guarantee is "null and void" if bags are opened in the market!
- Take advantage of training at Zamorano, CIMMYT, and CIAT.
- Initiate request and justify urgency and need to retain certification fees to provide additional support for Division activities.
- Private producers should pay additional fees for certification services.
- Install system to add new germination data instead of replacing entire tag and seal.

Laboratory

- Eliminate necessity of analysts taking official samples from producer inventory. This is the role of certification inspectors.
- Initiate some basic research, within the lab and personnel capabilities, to justify testing and labeling requirements. Restrictions on weed seeds are unrealistic - zero (0) occurrence. This is arbitrary.
- Review labeling for seed moisture at 10%, which seems unrealistic.
- If there are no weed seed identified, then eliminate it from the regulations.

Division of Seed Technology. This Division is the crucial link between the Research Program and the producer/farmer market. Their activities are essential to maintain continuity in the "flow" of seed material from the breeders to the ultimate farmer/consumer. This Department is a complex of individual sections and responsibilities, e.g., multiplication, production, processing, storage, and marketing. By its nature, therefore, there are more opportunities for malfunctions and consequently the need for greater change.

SPECIFIC RECOMMENDATIONS

Multiplication/Production

- This Division must terminate the production of commercial certified seed which is subsidized and in direct competition with private enterprise. A productive research program and a greater market demand will eventually push production of Foundation seed to a level to compensate for revenues lost from commercial seed sale.

Processing Plant

- Secure assistance to repair all non-functioning equipment - sheller, driers, and cleaning machinery.
- Enable appropriate personnel to attend training courses at Zamorano or CIAT.
- Determine needs to accommodate additional public-sector usage of processing unit on custom charge basis.

Storage Facilities

- Repair compressors and faulty material to bring existing storage units into usable status.
- Determine system to accommodate (inventory) public-sector usage of facilities.

Information. One of the key weaknesses of the industry is the dearth of information. Decisions in both sectors are made on educated guesses rather than well researched market and demand situations and outlook. Industry performance will be enhanced by strengthening information gathering, analysis, and dissemination. The following recommendations should be seriously considered by different agencies.

- DGEA should expand its information gathering activities to capture, for each type of seed on an annual basis production, processing, distribution, sales, prices, ending inventories, on-farm utilization, and import/export.
- UAPA should assist the private sector in demand analysis through similar exercises used in this report, or through application of more rigorous analytical techniques.
- UAPA should assist the private sector in publishing annual or semi-annual situation and outlook reports for the industry, including relevant events in neighboring countries.

Seed Production and Processing. Even though the market-place will ultimately discriminate among good and bad seed (and producers), until this industry appreciates the guiding forces of the market place and therefore its positive contribution to agriculture, a market oriented seed industry in support of agricultural development will have little chance to succeed.

In order to become more efficient and progressive the seed production and processing level of the seed industry should:

- Terminate the collusive practice of setting production quotas for members of ASPRODES and attempting to fix the price of seeds.
- Set up CENTA's seed processing and storage departments as quasi public utilities to provide fee based custom services to seed producers.
- Study feasibility of building labor intensive seed processing and storage facilities at production sites. For this to happen, the law and regulations will have to change drastically in support of a market oriented rather than state controlled system.
- Improve management and technical skills of personnel at existing processing facilities

Seed Marketing and Distribution. The seed industry can increase its share of total demand potential by strengthening its merchandising effectiveness and increasing its marketing efficiency. Some measures that will help, include:

- Development of effective general promotional material to increase technical and economic awareness of the benefits of improved and hybrid seeds at the farm level.
- Training of agroservicios personnel in effective merchandising techniques and specific promotional activities.
- Training agroservicios personnel in seed appreciation and need for farmer utilization of improved seeds.
- Incorporating agroservicios as an effective arm of the new extension structure and program. Provide training in technical aspects, in effective extension techniques, and provide them (or jointly) with effective extension and promotional materials.

Extension. The restructured extension service is a critical element in the "re-introduction" of improved and certified seeds. This "Extension by Objective" approach to extension can have a very positive effect on seed demand by making sure that three essential elements are well defined, integrated, executed and monitored.

- Re-establishment of a strong and permanent link to the research and certification activities at CENTA.
- Re-introduction of seed demonstration lots throughout the country.
- Development of effective seed extension materials and transfer techniques.

SECTION VI

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APPENDIX 1

GRAIN PRODUCTION STATISTICS

TABLE 15

AREA, PRODUCTION, AND YIELD OF WHITE CORN

Crop Year	AREA (Mz)			PRODUCTION (qq)			YIELD (qq/Mz)		
	National	Hybrid	Total	National	Hybrid	Total	National	Hybrid	Total
61-62	210,700	11,095	221,795	2,750,855	393,810	3,144,665	13.1	35.5	14.2
62-63	260,302	22,292	282,594	3,750,589	878,592	4,629,181	14.4	39.4	16.4
63-64	219,448	27,238	246,686	3,411,530	1,090,135	4,501,665	15.5	40.0	18.2
64-65	217,017	19,775	236,792	3,451,601	713,850	4,165,451	15.9	36.1	17.6
65-66	241,640	34,180	275,820	3,278,275	1,134,900	4,413,175	13.6	33.2	16.0
66-67	247,060	49,540	296,600	3,930,329	1,850,401	5,780,730	15.9	37.4	19.5
67-68	244,215	29,880	274,095	3,469,900	1,070,100	4,540,000	14.2	35.8	16.6
68-69	233,840	51,510	285,350	3,605,150	1,993,750	5,598,900	15.4	38.7	19.6
69-70	179,340	97,960	277,300	2,613,900	3,450,600	6,064,500	14.6	35.2	21.9
70-71	196,620	97,580	294,200	3,760,310	4,132,690	7,893,000	19.1	42.4	26.8
71-72	200,300	100,000	300,300	3,895,000	4,305,000	8,200,000	19.4	43.1	27.3
72-73	167,320	125,480	292,800	2,111,725	3,035,715	5,147,440	12.6	24.2	17.6
73-74	146,125	141,125	287,250	3,054,040	5,761,600	8,815,640	20.9	40.8	30.7
74-75	135,775	166,325	302,100	1,917,900	5,750,600	7,668,500	14.1	34.6	25.4
75-76	143,535	208,165	351,700	2,388,210	7,160,590	9,548,800	16.6	34.4	27.2
76-77	136,517	197,983	334,500	1,944,977	5,499,123	7,444,100	14.2	27.8	22.3
77-78	154,266	195,513	349,779	2,181,164	6,074,005	8,255,169	14.1	31.1	23.6
78-79	166,800	210,800	377,600	2,946,400	8,074,200	11,020,600	17.7	38.3	29.2
79-80	133,468	260,832	394,300	1,947,337	9,417,163	11,364,500	14.6	36.1	28.8
80-81	141,546	275,454	417,000	1,946,709	9,501,039	11,447,748	13.8	34.5	27.5
81-82	121,058	273,942	395,000	1,778,320	9,089,495	10,867,815	14.7	33.2	27.5
82-83	104,951	236,049	341,000	1,462,710	7,537,290	9,000,000	13.9	31.9	26.4
83-84	101,645	243,355	345,000	1,447,315	8,185,685	9,633,000	14.2	33.6	27.9
84-85	103,110	244,590	347,700	2,094,500	9,367,000	11,461,500	20.3	38.3	33.0
85-86	104,510	257,590	362,100	1,942,200	8,827,000	10,769,200	18.6	34.3	29.7
86-87	112,370	255,730	368,100	2,025,440	7,474,560	9,500,000	18.0	29.2	25.8
87-88	139,800	258,700	398,500	2,821,590	9,754,300	12,575,890	20.2	37.7	31.6
88-89	148,100	254,700	402,800	3,686,800	9,269,400	12,956,200	24.9	36.4	32.2
89-90	152,700	242,000	394,700	3,968,400	8,825,900	12,794,300	26.0	36.5	32.4
90-91	171,600	231,000	402,600			0	0.0	0.0	0.0

Source: DGEA

File: CORN.WQ1

TABLE 16

SORGHUM AREA, PRODUCTION AND YIELD

	AREA (Mz)			PRODUCTION (QQ)			YIELDS (QQ/Mz)		
Crop Year	National	Improved	Total	National	Improved	Total	National	Improved	Total
61-62			140,470			1,835,[illegible]0			13.1
62-63			150,189			2,429,235			16.2
63-64			143,453			2,117,024			14.8
64-65			124,455			1,907,450			15.3
65-66			158,700			2,295,900			14.5
66-67			153,719			2,493,049			16.2
67-68			148,400			2,350,000			15.8
68-69			162,500			2,700,200			16.6
69-70			162,575			2,784,100			17.1
70-71			177,400			3,199,700			18.0
71-72			180,000			3,400,000			18.9
72-73			186,400			3,170,000			17.0
73-74			170,000			3,400,000			20.0
74-75			182,000			2,850,000			15.7
75-76			189,100			3,800,000			20.1
76-77			178,500			3,399,200			19.0
77-78	176,455	12,344	188,799	2,440,635	344,364	2,784,999	13.8	27.9	14.8
78-79	183,742	11,658	195,400	3,486,979	330,721	3,817,700	19.0	28.4	19.5
79-80	192,430	12,570	205,000	3,140,945	344,055	3,485,000	16.3	27.4	17.0
80-81	160,233	10,467	170,700	2,740,689	300,211	3,040,900	17.1	28.7	17.8
81-82	154,915	10,025	164,940	2,658,594	291,686	2,950,280	17.2	29.1	17.9
82-83	161,807	8,193	170,000	2,503,333	196,667	2,700,000	15.5	24.0	15.9
83-84	145,170	12,830	158,000	2,375,140	301,960	2,677,100	16.4	23.5	16.9
84-85	147,500	18,500	166,000	2,433,000	620,900	3,053,900	16.5	33.6	18.4
85-86	145,000	18,400	163,400	2,419,100	463,700	2,882,800	16.7	25.2	17.6
86-87	150,200	21,300	171,500	2,630,200	576,600	3,206,800	17.5	27.1	18.7
87-88	150,500	28,200	178,700	458,740	105,460	564,200	3.0	3.7	3.2
88-89	147,400	26,800	174,200	2,748,800	583,900	3,332,700	18.6	21.8	19.1
89-90	141,700	29,200	170,900	2,606,600	643,100	3,249,700	18.4	22.0	19.0

Source: DGEA

File:SORGHUM.WQ1

TABLE 17

RICE AREA, PRODUCTION AND YIELD

Crop Year	Area (Mz)	Production (qq/Mz)	Yield (qq/Mz)
61-62	12,710	388,700	30.6
62-63	15,519	557,233	35.9
63-64	12,234	448,597	36.7
64-65	21,150	718,971	34.0
65-66	18,900	758,123	40.1
66-67	28,178	1,096,179	38.9
67-68	40,000	1,692,240	42.3
68-69	39,000	1,730,700	44.4
69-70	15,300	775,700	50.7
70-71	17,000	961,550	56.6
71-72	20,920	1,192,300	57.0
72-73	15,700	774,600	49.3
73-74	13,600	809,500	59.5
74-75	15,900	697,700	43.9
75-76	24,200	1,320,000	54.5
76-77	19,710	776,100	39.4
77-78	17,800	712,600	40.0
78-79	19,850	1,104,500	55.6
79-80	21,100	1,266,200	60.0
80-81	24,000	1,320,000	55.0
81-82	19,800	1,089,790	55.0
82-83	16,000	770,000	48.1
83-84	18,000	940,000	52.2
84-85	21,900	1,376,000	62.8
85-86	24,700	1,497,600	60.6
86-87	17,200	1,020,400	59.3
87-88	16,700	914,550	54.8
88-89	19,700	1,245,900	63.2
89-90	22,200	1,385,200	62.4

Source: DGEA

File: RICE.WQ1

TABLE 18

BEAN AREA, PRODUCTION AND YIELD

Crop Year	Area (Mz)	Production (qq/Mz)	Yield (qq/Mz)
61-62	30,700	227,815	7.4
62-63	47,044	398,959	8.5
63-64	39,690	314,400	7.9
64-65	30,541	269,082	8.8
65-66	33,600	359,700	10.7
66-67	37,761	336,120	8.9
67-68	40,595	380,120	9.4
68-69	45,270	462,400	10.2
69-70	46,965	571,460	12.2
70-71	51,600	649,500	12.6
71-72	57,000	750,000	13.2
72-73	56,850	595,700	10.5
73-74	64,440	814,700	12.6
74-75	73,470	732,200	10.0
75-76	79,800	861,800	10.8
76-77	75,540	870,100	11.5
77-78	75,125	733,540	9.8
78-79	74,000	933,000	12.6
79-80	78,700	1,011,330	12.9
80-81	75,000	866,500	11.6
81-82	71,000	831,820	11.7
82-83	79,400	830,000	10.5
83-84	80,500	918,300	11.4
84-85	82,500	1,056,000	12.8
85-86	83,300	751,200	9.0
86-87	87,100	1,093,900	12.6
87-88	89,300	531,000	5.9
88-89	96,100	1,240,000	12.9
89-90	91,600	968,900	10.6

Source: DGEA

File: BEANS.WQ1

APPENDIX 2

TERMS OF REFERENCE
PROPOSALS

1. STUDY: APPRAISAL OF THE STATUS OF THE SEED INDUSTRY AND ACTION RECOMMENDATIONS FOR ITS REACTIVATION

OBJECTIVES:

Appraise the current condition of the seed industry in El Salvador, document the reasons for its decline, the consequence, and develop a comprehensive plan for its reactivation.

RATIONALE:

During the last decade, the seed industry has suffered a severe constriction in terms of the volume of certified (hybrids) and improved seed produced and the number of firms engaged in this industry. This undesirable trend is reflected in the reduced levels of commercial seed production and distribution, the declining use of F1 generation and the increase use of F2 and F3 generation at the farm level, and most of all in the stagnated production yields.

Continuation of these negative trends in seed utilization and national production yields of basic foods such as white corn and beans will expose the country to an increasing basic food gap, reduced rural income levels, increased levels of imports, and utilization of scarce foreign exchange.

UTILIZATION OF RESULTS:

This information would be used by the GOES, USAID/El Salvador, other donors, and financial agencies in planning and coordinating a turnaround of the industry.

STEPS TO BE FOLLOWED IN IMPLEMENTING THE ACTIVITY:

1. Conduct literature review prior to field work.

2. Conduct an in-country appraisal mission to (1) review the status of the production and distribution of certified and improved seeds, (2) review the patterns of seed utilization by farmers, (3) assess the condition of the physical infrastructure used in the production, processing, and certification of seeds, (4) assess the adequacy of current technical, managerial and marketing skills of seed industry personnel and public-sector personnel, (5) review appropriateness of current laws and regulations pertinent to the industry, (6) assess the potential consequences for the industry of current policy and structural changes taking place, and (7) review the current roles of the public and private sector.

3. Develop (1) conclusions, (2) action recommendations, and (3) reactivation plan for the industry.

4. Provide GOES and USAID official with final team report in English one week before departure.

5. Conduct seminar/workshop with private-sector representatives, public-sector officials, and USAID personnel prior to departure. Results of presentation and discussion feedback will be included in final English report.

6. Translate and type report in Spanish (in the USA).

7. Submit final Spanish report to USAID/El Salvador.

PERSONNEL ASSIGNED:

1. Seed Specialist: Dr. Hunter Andrews, Mississippi State University.

2. Marketing Specialist: Dr. Cornelius Hugo, Kansas State University.

TIMING AND DURATION:

Time Schedule: Open

Duration: 4 weeks for in-country appraisal mission
2 weeks for in-country report writing and seminar/workshop
1 week for final English report preparation and typing in the US
3 week for translation into Spanish
1 week for final Spanish report typing

APPENDIX 3

CONTACTS

1. MAG
   Dr. Antonio Cabrales, Ministro

2. OSPA
   Lic. Mercedes Llort, Directora

3. AUPA
   Lic. Luis Enrique Córdoba, Director
   Lic. José Luis Arevalo

4. DGEA
   Lic. Julio Cesar Gonzales, Sub-director
   Lic. Francisco Vanegas

5. Defensa Agropecuaria
   Dr. Rolando Martinez Melara, Director

6. CENTA
   Dr. Ever Amaya, Director
   Ing. Salvador Berríos, Jefe de la División de Certifcación de Semillas
   Carlos Atillo Perez Cabrera, Investigación de Leguminosas
   Adan Aguiluz, Invesigación de Maíz
   Mauricio Manzano, Jefe de la División de Tecnología y Plantas

7. DESAP
   Ing. Roberto Rodriguez, Director

8. ASPRODES
   See Annex 5

9. ADAES
   Dr. Ricardo Escobar, Secretario
   Many other members

10. APA
    Some members

11. AGRIDEC
    Sra. Maria Helena Irastorza, Coordinadora Academica

12. FAO
    Dr. José Tubino, Representante en El Salvador
    Dr. Jaime A. Novoa Economista
    Dr. Hugo Ramos, Consultor
    Ing. Edgar Morales, Consultor

13. CLUSA
    Sr. Satley Khuen, Director
    Lic. Mauricio Salinas

14. PMA
    Dr. Oscar Sarroca, Representanta en El Salvador

15. BFA
    Lic. Carlos Abel Membreño, Gerencia General
    Ing. Rafael Blanco Alarcón, Gerente de Planificación
    Lic. Monje Ayala

16. Agroservicios
    Many

17. USAID/San Salvador
    Dr. Ken Ellis, RDO, Chief
    Dr. Mike Wise, RDO, Project Officer
    In. Adolfo Cristales, Project Officer

APPENDIX 4

GRAIN PRODUCTION CREDIT

TABLE 19

AREA FINANCED AS PERCENTAGE OF TOTAL AREA PLANTED

Year	Crop	Total Area Harvested (Mz)	Area Financed by BFA (Mz)	BFA Share	Amount & Share of Credit (C 1,000) Other Banks 2/	BFA Share	Total Amount	BFA Share
1990/91	Corn		78,729	ERR				
	Sorghum		22,930	ERR				
	Beans		15,[illegible]6	ERR				
	Rice		7,[illegible]1	ERR				
	Total	0	123,993	ERR				
1989/90	Corn	394,700	94,157	23.9%				
	Sorghum	170,200	27,308	16.0%				
	Beans	91,600	27,058	29.5%				
	Rice	22,200	9,749	43.9%				
	Total	678,700	158,272	23.3%				
1988/89	Corn	402,800	91,926	22.8%	20,256	81,584	101,840	80.11%
	Sorghum	174,200	23,392	13.4%	NA	NA		
	Beans	96,100	27,021	28.1%	1,564	18,380	19,944	92.16%
	Rice	19,700	9,503	48.2%	7,709	19,703	27,412	71.88%
	Total	692,800	151,842	21.9%	29,529	119,667	149,196	80.21%
1987/88	Corn	398,500	111,919	28.1%				
	Sorghum	178,700	28,454	15.9%				
	Beans	89,300	29,970	33.6%				
	Rice	16,700	8,497	50.9%				
	Total	683,200	178,840	26.2%				
1986/87	Corn	368,100	127,952	34.8%				
	Sorghum	171,500	28,600	16.7%				
	Beans	87,100	34,926	40.1%				
	Rice	17,200	10,938	63.6%				
	Total	643,900	202,416	31.4%				
1985/86	Corn	362,100	138,647	38.3%				
	Sorghum	163,400	30,346	18.6%				
	Beans	83,300	32,956	39.6%				
	Rice	24,700	16,475	66.7%				
	Total	633,500	218,424	34.5%				
1984/85	Corn	347,700	123,550	35.5%				
	Sorghum	166,000	30,038	18.1%				
	Beans	82,500	26,186	31.7%				
	Rice	21,900	14,850	67.8%				
	Total	618,100	194,624	31.5%	21,478	89,638	111,116	80.67%
1983/84	Corn	345,000	104,105	30.2%				
	Sorghum	158,000	26,419	16.7%				
	Beans	80,500	20,316	25.2%				
	Rice	18,000	13,036	72.4%				
	Total	601,500	163,876	27.2%				
1982/83	Corn	341,000	112,586	33.0%				
	Sorghum	170,000	29,814	17.5%				
	Beans	79,400	30,953	39.0%				
	Rice	16,000	12,436	78.0%				
	Total	606,400	185,839	30.6%				
1981/82	Corn	395,000	134,388	34.0%				
	Sorghum	164,940	52,095	31.6%				
	Beans	71,000	35,783	50.4%				
	Rice	19,800	15,106	76.3%				
	Total	650,740	237,372	36.5%				
1980/81	Corn	417,000	150,436	36.1%				
	Sorghum	170,700	64,256	37.6%				
	Beans	75,000	32,153	42.9%				
	Rice	24,000	17,144	71.4%				
	Total	686,700	263,989	38.4%				

AREA FINANCED AS PERCENTAGE OF TOTAL AREA PLANTED (cont.)

Year	Crop	Total Area Harvested (Mz)	Area Financed by BFA (Mz)	BFA Share	Amount & Share of Credit (C 1,000) Other Banks 1/	BFA Share	Total Amount	BFA Share
1979/80	Corn	394,300	132,790	33.7%				
	Sorghum	205,000	61,163	29.8%				
	Beans	78,700	30,962	39.3%				
	Rice	21,100	14,598	69.2%				
	Total	699,100	239,513	34.3%				
1978/79	Corn	377,600	99,672	[illegible].4%				
	Sorghum	195,400	39,268	20.1%				
	Beans	74,000	20,018	27.1%				
	Rice	19,850	9,324	47.0%				
	Total	666,850	168,282	25.2%				
1977/78	Corn	349,779	83,502	23.9%				
	Sorghum	188,799	28,547	15.1%				
	Beans	75,125	16,854	22.4%				
	Rice	17,800	8,820	49.6%				
	Total	631,503	137,723	21.8%				
1976/77	Corn	334,500	83,045	24.8%				
	Sorghum	178,500	14,576	8.2%				
	Beans	75,540	18,317	24.2%				
	Rice	19,710	10,467	53.1%				
	Total	608,250	126,405	20.8%				
1975/76	Corn	351,700	63,632	18.1%				
	Sorghum	189,100	3,845	2.0%				
	Beans	79,800	11,190	14.0%				
	Rice	24,200	12,329	50.9%				
	Total	644,800	90,996	14.1%				
1974/75	Corn	302,100	45,389	15.0%				
	Sorghum	182,000	2,352	1.3%				
	Beans	73,470	7,06[illegible]	9.6%				
	Rice	15,900	7,329	46.1%				
	Total	573,470	62,135	10.8%				
1973/74	Corn	287,250		0.0%				
	Sorghum	170,000		0.0%				
	Beans	64,440		0.0%				
	Rice	13,600		0.0%				
	Total	535,290	29,900	5.6%				
1972/73	Corn	292,800	17,734	6.1%				
	Sorghum	186,000	387	0.2%				
	Beans	56,850	2,691	4.7%				
	Rice	15,700	3,785	24.1%				
	Total	551,350	24,597	4.5%				
1971/72	Corn	300,300	26,543	8.8%				
	Sorghum	180,000	1,066	0.6%				
	Beans	57,000	3,997	7.0%				
	Rice	20,920	3,768	18.0%				
	Total	558,220	35,374	6.3%				
1970/71	Corn	294,200	20,463	7.0%				
	Sorghum	177,400	6,428	3.6%				
	Beans	51,600	3,769	7.3%				
	Rice	17,000	2,784	16.4%				
	Total	540,200	33,444	6.2%				
1969/70	Corn	277,300	18,911	6.8%				
	Sorghum	162,575	6,183	3.8%				
	Beans	46,965	4,793	10.2%				
	Rice	15,300	2,869	18.8%				
	Total	502,140	32,756	6.5%				
1968/69	Corn	285,350	24,544	8.6%				
	Sorghum	162,500	7,846	4.8%				
	Beans	45,270	2,828	6.2%				
	Rice	39,000	6,225	16.0%				
	Total	532,120	41,443	7.8%				

AREA FINANCED AS PERCENTAGE OF TOTAL AREA PLANTED (cont.)

Year	Crop	Total Area Harvested (Mz)	Area Financed by BFA (Mz)	BFA Share	Amount & Share of Credit (C 1,000)			
					Other Banks 1/	BFA Share	Total Amount	BFA Share
1967/68	Corn	274,095	14,574	5.3%				
	Sorghum	148,400	2,259	1.5%				
	Beans	40,595	1,450	3.6%				
	Rice	40,000	5,465	13.7%				
	Total	503,090	23,748	4.7%				
1966/67	Corn	296,600	10,563	3.6%				
	Sorghum	153,719	3,237	2.1%				
	Beans	37,761	923	2.4%				
	Rice	28,178	1,721	6.1%				
	Total	516,258	16,444	3.2%				
1965/66	Corn	275,820	16,341	5.9%				
	Sorghum	158,700	5,014	3.2%				
	Beans	33,600	1,425	4.2%				
	Rice	18,900	2,673	14.1%				
	Total	487,020	25,453	5.2%				
1964/65	Corn	236,792	9,021	3.8%				
	Sorghum	124,455	2,768	2.2%				
	Beans	30,541	787	2.6%				
	Rice	21,150	1,475	7.0%				
	Total	412,938	14,051	3.4%				
1963/64	Corn	246,586	4,955	2.0%				
	Sorghum	143,453	1,520	1.1%				
	Beans	39,690	432	1.1%				
	Rice	12,234	810	6.6%				
	Total	442,063	7,717	1.7%				

Source: BFA Memorias

File: CREDIT.WQ1

APPENDIX 5

MEMBERS OF THE SEED PRODUCERS ASSOCIATION

NOMINA DE ASOCIADOS ASPRODES

PRODUCTOR	DIRECCION	TELEFONO
1. Agr. Enrique Alfaro	Diagroson Av. Oidor Ramírez de Quiñonez 1-2 Sonesonate	510461
2. Acra Col. Nva. Guayapa	R/Ing. Juan Fco. Avalos Cantón Sta Lucía Zona 2, Calle La Estación-Cd. Arce	309341
3. Ing. Daniel Portillo	San Vicente	330494
4. Acra Lombardía	R/Br. Julio Portillo Final 6a. Av. Sur #26 Col.San Antonio Bo.El Carmen, Zacatecoluca	341719
5. Lic. Jorge A. Cea h.	11 Av.Sur 7-6 Col.Utila Sta.Tecla.	281738
6. Prosela,S.A.	Ing. Mariano Calderón 9a. C. Ote entre 5a.y 7a.Av.Nte #12 Sta.Tecla.	281837
7. Acra Escuintla	Ing.Noé Burgos Col.Jardines de Guadalupe Calle Bósforo #40 Antiguo Cuscatlán	239315
8. Semillas,S.A.	Luis A. Arriola Km.12.2 Carret.Panam Ote. Ilopango.	271820
9. Avelar Hnos,S.A.	R/Lie.Baltazar Guillén Calle a Sta.Tecla ¢3528,S.S.	239622

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NOMINA DE ASOCIADOS ASPRODES

PRODUCTOR	DIRECCION	TELEFONO
10. Agroconsa,S.A.	R/Ing.Guillermo Valiento Pje Senda Florida #152 Col. Escalon S.S.	243203
11. Acra Montefresco	R/Antel Tránsito,Depto.Sn.Miguel Col.Nva.Metrópoli	269615 257529
12. Ing.Franklin Vale José Infantozzi	Polígono G #4 27 Av.Nte #1133	 257529

APPENDIX 6

CULTIVATED MANZANAS OF CERTIFIED SEED 1980/81 - 1989/90

TABLE 20

CULTIVATED MANZANAS OF CERTIFIED SEED 1980/81

	Corn			Rice			Sorghum	
Producer	H-3	H-5	Total	A-1	CICA-9	Total	S-3	Total
ACRA Lombardia	163	45	208			0		0
Daniel Portillo	70	115	185			0		0
Avelar Hnos.	46	12	58			0		0
Joval Diaz	125	145	270			0		0
Cristiani	487	416	903			0		0
Borgonovo	30	172	202			0		0
Dr. Contreras	27.5		27.5			0		0
CENTA	129.5	38	167.5	75	23	98	4	4
Total	1,078	943	2,021	75	23	98	4	4

TABLE 21

CULTIVATED MANZANAS OF CERTIFIED SEED 1981/82

	Corn					Rice			Sorghum		
Producer	H-3	H-5	H-9	H-101	Total	A-1	X-10	Total	S-1	S-3	Total
ACRA Lombardia		70			70			0			0
ACRA Guayapa	38	299			337			0			0
ACRA Cara Sucia	150	397			547			0			0
ACRA Tongolona		80			80			0			0
ACRA San Carlos	40				40			0			0
Daniel Portillo	34	140		25	199			0			0
Avelar Hnos.	39	17			56			0			0
Joval Diaz		120			120			0			0
Jose A. Reyes					0			0	89		89
G. Henrique					0	10.5		10.5			0
Roberto Perla				31	31			0			0
CENTA		13	45	43	101	53	13.57	66.57		5	5
Total	301	1,136	45	99	1,581	64	14	77	89	5	94

TABLE 22

CULTIVATED MANZANAS OF CERTIFIED SEED
1982/83

Producer	Corn H-3	H-5	H-102	Total	Rice A-1	A-2	Total	Sorghum S-2	SS-41	I-D	Total
ACRA Lombardia	36	83		119			0				0
ACRA Guayapa	188	213.5		401.5			0				0
ACRA Montefresco	60			60			0				0
ACRA Cara Sucia	140	401		541			0				0
ACRA San Carlos	20	76		96			0				0
Daniel Portillo	60	140		200			0				0
Joval Diaz	130			130			0				0
Avelar Hnos.	41	10		51			0				0
Roberto A. Perla		46	13	59	35		35				0
Nicolas Corronza	55	140		195	225		225	4.5			4.5
Julio Zamora				0	20		20				0
Manuel Lainez		50		50			0				0
Mejia Rivas	87			87			0				0
A. Aventono		130		130			0				0
G. Tamacos				0	25		25				0
AGROCONSA				0			0		20		20
CENTA	20	6	5	31		10	10	33		12	45
Total	837	1,296	18	2,151	305	10	315	38	20	12	70

TABLE 23

CULTIVATED MANZANAS OF CERTIFIED SEED
1983/84

Producer	Corn H-3	H-5	H-9	H-102	Total	Rice A-1	A-2	Total	Sorghum S-2	S-3	SS-41	I-D	No. 1	Total
ACRA Lombardia	70	68			138			0						0
ACRA Guayapa	26	289			315			0						0
ACRA Montefresco		60			60			0						0
ACRA San Andres	25	50			75			0						0
ACRA Cara Sucia	82	122.5			204.5			0						0
Daniel Portillo	80	100			180			0						0
SEMILLAS, S.A.	56	66.5			122.5			0						0
Avelar Hnos.	54.5	14			68.5			0						0
AGROCONSA					0			0			30	11.5		41.5
PROSELA, S.A.	50	100			150			0						0
Guillermo Tamacos					0	13.26		13.26						0
Nicolas Corronza				20	20	114		114	10					10
Julio R. Zamora					0	20		20						0
A. Avendono		79			79			0						0
Ricardo Acevedo					0		75	75						0
ENA					0	0.71		0.71						0
CENTA	61.5		18		79.5	23.25	27.46	50.71	7	10	5	13	7	42
Total	505	949	18	20	1,492	171	102	274	17	10	35	25	7	94

TABLE 24

CULTIVATED MANZANAS OF CERTIFIED SEED
1984/85

Producer	Corn H-3	H-5	H-9	Total	Rice A-1	A-2	Total	Sorghum S-2	SS-41	I-D	Total
ACRA Lombardia	70	68		138			0				0
ACRA Guayapa	72	246		318			0				0
ACRA Montefresco		59		59			0				0
ACRA San Andres	48	43		91			0				0
Daniel Portillo	40	30	20	90	25		25				0
Jorge A. Cea				0		11.58	11.58				0
SEMILLAS, S.A.		66		66			0				0
Avelar Hnos.	37	13		50			0				0
AGROCONSA				0			0		20		20
PROSELA, S.A.		55	50	105	25		25				0
Guillermo Tamacos				0	6.8		6.8				0
Roberto Perla				0	50		50				0
ENA				0	7.71		7.71				0
CENTA	10		65	75	15.5	23	38.5	20	13	6.43	39.43
Total	277	580	135	992	130	35	165	20	33	6	59

TABLE 25

CULTIVATED MANZANAS OF CERTIFIED SEED
1985/86

Producer	Corn H-3	H-5	H-9	H-102	Total	Rice A-1	A-2	Total	Sorghum S-2	SS-41	I-D	Total
ACRA Lombardia	32	101	18		151	14		14				0
ACRA Guayapa	26	240	78		344			0				0
ACRA Montefresco		60	19		79			0				0
ACRA San Andres	27	50			77			0				0
Daniel Portillo		85	40		125			0				0
Jorge A. Cea					0		23.16	23.16				0
SEMILLAS, S.A.	56	66			122			0				0
Avelar Hnos.	50				50	20		20		20		20
AGROCONSA					0			0		33	19	52
PROSELA, S.A.		179			179	30		30	50			50
ENA					0			0				0
CENTA			63	14	77		15.7	15.7		10		10
Total	191	781	218	14	1,204	64	39	103	50	63	19	132

TABLE 26

CULTIVATED MANZANAS OF CERTIFIED SEED
1986/87

	Corn						Rice			Sorghum				
Producer	H-3	H-5	H-9	H-17	H-102	Total	A-1	A-2	Total	S-2	S-3	SS-41	I-D	Total
ACRA Lombardia	43	138				181	25		25					0
ACRA Guayapa	98	231				329	19		19	46				46
ACRA Montefresco		60				60			0					0
ACRA San Carlos	25	50				75			0					0
ACRA El Nilo						0		45	45					0
Daniel Portillo		100				100			0					0
Jorge A. Cea		27.5				27.5		27.36	27.36					0
Pedro O. Perdomo						0	49		49					0
SEMILLAS, S.A.	56	116				172			0					0
Avelar Hnos.						0	30		30			20		20
AGROCONSA						0			0			40	26	66
Guillermo Tamocos		5				5	24.26		24.26		20.5			20.5
Nomano Salazar						0		14	14					0
Jose Chirmo						0	118		118					0
Julio Zomora						0		25.06	25.06					0
Napoleon Puentes					75	75	25		25					0
ENA				16		16			0					0
CENTA		11	37		38	86	41	17	58	8	0.21		5	13.21
Total	222	739	37	16	113	1,127	331	128	460	54	21	60	31	166

TABLE 27

CULTIVATED MANZANAS OF CERTIFIED SEED
1987/88

	Corn					Rice				Sorghum				
Producer	H-3	H-5	H-9	H-17	Total	A-1	A-2	A-4	Total	S-2	SS-41	I-D	AG-1	Total
ACRA Lombardia	39	142			181				0					0
ACRA Guayapa		285			285	8			8					0
ACRA Montefresco		50			50				0					0
ACRA San Andres	30	43			73				0					0
Daniel Portillo	20	94			114				0					0
PROSELA, S.A.		125			125				0					0
Enrique Alfaro		90			90	30			30	15				15
Jorge A. Cea		21			21		14.26		14.26			5.5		5.5
Pedro O. Perdomo				60	60	45			45					0
SEMILLAS, S.A.	66	129			195				0					0
Avelar Hnos.					0	30			30		20			20
Jose Infantozzi					0			25	25			65		65
Gerardo Cardoza					0	50			50					0
AGROCONSA					0				0		30	24	10	64
CENTA			5		5	6.2		4.86	11.06	38.36	14	7.5		59.86
Total	155	979	5	60	1,199	169	14	30	213	53	64	102	10	229

TABLE 28

CULTIVATED MANZANAS OF CERTIFIED SEED
1988/89

Producer	Corn H-3	H-5	H-9	H-17	H-53	H-102	Total	Rice A-1	A-2	A-4	A-5	Total	Sorghum S-2	S-3	I-D	Total
ACRA Lombardia	46	125					171					0				0
ACRA Guayapa		288					288					0				0
ACRA Montefresco		50					50					0				0
ACRA San Andres	25	50					75					0				0
ACRA Escuintla		20					20	8	10			18				0
Daniel Portillo	30	110					140					0				0
PROSELA, S.A.	19	140					159					0				0
Enrique Alfaro		100					100					0				0
Jorge A. Cea		82					82					0			25	25
Pedro O. Perdomo		50		60		15	125	50				50				0
SEMILLAS, S.A.	66	133					199					0				0
Franklin Valle							0	22				22				0
Avelar Hnos.							0	25				25				0
Jose Infantozzi							0	25				25			30	30
Gerardo Cardoza							0	55				55				0
Napoleon Puentes							0					0	15			15
CENTA			15.5		0.71		16.21		6.96	27	3	36.96	7	8		24
Total	186	1,148	16	60	1	15	1,425	185	17	27	3	232	22	8	64	94

TABLE 29

CULTIVATED MANZANAS OF CERTIFIED SEED
1989/90

Producer	Corn H-3	H-5	H-9	H-17	H-53	H-56	H-102	Total	Rice A-1	A-2	A-4	A-5	Total	Sorghum S-2	SS-41	I-D	Total
ACRA Lombardia	41	90						131					0				0
ACRA Guayapa	50							50					0				0
ACRA Montefresco		50						50					0				0
ACRA San Andres	32							32					0				0
ACRA Escuintla	12	9						21	10		10		20				0
Daniel Portillo	30	107						137					0				0
PROSELA, S.A.	76	180		18		3	33	310					0				0
Enrique Alfaro	30	17						47	15				15	25			25
Jorge A. Cea	20	35						55	10	10	10		30				0
Pedro O. Perdomo		40						40	30				30				0
SEMILLAS, S.A.		131						131					0				0
Franklin Valle	66							66	25				25				0
Avelar Hnos.								0	25				25				0
Jose Infantozzi								0	10		20		30				0
AFROCONSA								0					0		30		30
CENTA			27		2			29	7.2		17.35	5	29.55			10	10
Total	357	659	27	18	2	3	33	1,099	132	10	57	5	205	25	30	10	65

Source: CENTA

File: SEED-MZ.WQ1

APPENDIX 7

LEY DE CERTIFICACION DE SEMILLAS - 1971

"LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS"

1 9 7 1

Ministerio de Agricultura y Ganadería
Dirección General de Investigación y
Extensión Agropecuaria.

DEPARTAMENTO DE INCREMENTACION Y
CERTIFICACION DE SEMILLAS Y PLANTAS

Santa Tecla, El Salvador C. A.

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DECRETO M° 229.

LA ASAMBLEA LEGISLATIVA DE LA REPUBLICA DE EL SALVADOR,

CONSIDERANDO:

I- Que el progreso de la agricultura está íntimamente vinculado con el empleo de semillas y plantas genéticamente mejoradas y de óptima calidad, en los cultivos;

II- Que tanto el sector privado como el público, a través de investigaciones técnicas, han logrado obtener mejores variedades de semillas y plantas, que avantajan notablemente a las cultivadas comúnmente en el país, por su capacidad de rendimiento, adaptabilidad y otras características agronómicas valiosas;

III- Que es preciso extender los resultados de esas investigaciones técnicas para que sean aprovechadas por los agricultores y que, asimismo la producción y comercio interno y externo de semillas y plantas mejoradas deben estar respaldados por una legislación adecuada para garantizar la calidad y pureza de las mismas,

POR TANTO,

en uso de sus facultades constitucionales y a iniciativa del Presidente de la República, por medio del Ministro de Agricultura y Ganadería,

DECRETA la siguiente:

LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS

CAPITULO I

DISPOSICIONES PRELIMINARES

Art. 1. El Ministerio de Agricultura y Ganadería, para efectos de certificación, controlará la producción, comercio, importación y exportacióde las semillas y plantas de calidad y pureza genética comprobadas, destinadas a diversificar e incrementar la producción agrícola nacional.

La atribución expresada en el inciso anterior, corresponderá a la Dirección General de Investigación y Extensión Agropecuaria, por medio de su Departamento de Incrementación y Certificación de Semillas y Plantas, que en el texto de esta Ley se deominará "el Departamento", el cual estará a cargo de un Jefe, que será designado por el Poder Ejecutivo en el Ramo de Agricultura y Ganadería.

Art. 2. Para los efectos de esta Ley, se entenderá por:

a) Semilla: todo material vegetal destinado a la reproducción.

b) Planta: vegetal originado de la "semilla" anteriormente descrita.

c) Semillas o plantas certificadas: las producidas bajo la supervisión del Departamento y para cuya obtención se han llenado los requisitos exigidos por esta Ley y por los Reglamentos respectivos, para su certifición.

d) Categorías y fuentes de semillas certificadas: son las que se describen a conninuación:

1°) SEMILLA ORIGINAL O BASICA: la que permanece bajo control de quienes la forman o mejoran, y origina la semilla de fundación.

2°) SEMILLA DE FUNDACION: la progenie de la semilla original o básica; producida y menejada de tal manera que conserve en sumo grado su identidad genética específica y máxima pureza.

3°) SEMILLA REGISTRADA: la progenie de la semilla de fundación, que ha sido producida y manejada de manera que mantenga satisfactoria pureza e identidad genética.

4°) SEMILLA CERTIFICADA: la progenie de la semilla de fundación o de semilla registrada, que ha sido producida y manejada de manera que posea satisfactoria identidad genética y pureza.

e) Productor: es toda persona, entidad, corporación oficial o particular, inscrita en el Departamento y autorizada por el mismo, para producir semilla certificable.

f) Etiqueta: es la rotulación impresa o manuscrita, puesta al empaque o envase que contiene semillas, o a la planta, la cual indica su clasificación, origen y demás especificaciones que sirvan para identificarla.

g) Marchamo: sello de garantía, que por su fabricación especial, sólo puede ser usado correctamente una vez.

Art. 3. Son atribuciones de Departamento:

a) Velar por el cumplimiento de esta Ley o sus Reglamentos;

b) Verificar la autenticidad de las semillas y plantas que se produzcan en el país y de las importadas destinadas a los fines que señala esta Ley;

c) Inspeccionar los campos de propagación, producción, beneficio y almacenamiento de semillas y plantas que se pretende certificar;

d) Tomar muestras de lotes de semillas y plantas ya certificadas, con el fin de comprobar que mantienen los requisitos que esta Ley o sus Reglamentos determinan;

e) Proporcionar las etiquetas y marchamos a los productores de semillas o plantas calificadas, previo el pago de los derechos respectivos;

f) Certificar las semillas y plantas producidas en el país;

g) Conceder licencia a las personas naturales o jurídicas que deseen dedicarse a la producción de semillas y plantas certificadas.

CAPITULO II

DE LA PRODUCCION Y DEL COMERCIO

DE LA PRODUCCION:

Art. 4. Toda persona natural o jurídica, previa licencia, podrá dedicarse a la producción de semillas o plantas certificadas, siempre que llene los requisitos exigidos por esta Ley, sus reglamentos y las normas de certificación que ponga en vigor el Departamento.

Todo productor particular deberá contar con los servicios técnicos de un profesional en Agronomía o una persona idónea expresamente autorizada por el Departamento, caso que él no lo fuere.

Art. 5. Las semillas o plantas importadas para proceso de certiicación deberán venir certificadas en la categoría correspondiente por Organismo compatente del país de origen, cuyas normas de certificación no deberán ser inferiores a las adoptadas por el Departamento.

DEL COMERCIO:

Art. 6. Sólo podrán usarse las expresiones "semilla controlada", "semilla inspeccionada", u otras semejantes, en propaganda cuando hayan sido autorizadas por el Departamento.

Art. 7. Los establecimientos comerciales que negocian con semillas importadas deberán registrar en el Departamento las marcas de semillas certificadas que distribuyan mediante licencia.

CAPITULO III

PROHISICIONES

Art. 8. Queda especialmente prohibido:

a) Poner en circulación semillas o plantas con etiqueta de certificación, cuando en realidad no hayan sido certificadas;

b) Separar o destruir maliciosamente o alterar en parte o totalmente la etiqueta o marchamo de certificación;

c) Traficar con semillas o plantas cuyas especificaciones no correspondan con las que se indiquen en la etiqueta respectiva;

d) Importar semillas o plantas en contravención a lo dispuesto en esta Ley o sus reglamentos;

e) Ofrecer a la venta semillas o plantas certificadas que no presenten el marchamo de certificación correspondiente.

CAPITULO IV

DE LAS SANCIONES, Y DEL PROCEDIMIENTO PARA IMPONERLAS

Art. 9. Cualquiera infracción a esta Ley o sus Reglamentos será sancionada con multa de cien a un mil colones, según la gravedad de la infracción, de acuerdo con el Reglamento respectivo.

Se procederá, asimismo, al decomiso de las semillas y plantas, cuando hayan sido importadas y puestas al comercio como certificadas sin llenarse los requisitos que esta Ley y sus Reglamentos establecen.

Art. 10. El Departamento suspenderá definitivamente o por el tiempo que estime prudente, la licencia de operación de aquellos productores, importadores o vendedores de semillas o plantas certificadas, que en forma reiterada infrinjan las disposiciones de esta Ley o sus Reglamentos.

La misma sanción se aplicará a aquellos productores que den muestras de notoria incapacidad para cumplir con los requisitos de certificación.

Art. 11. Al tener conimiento de una infracción a la presente Ley o sus Reglamentos, el Jefe del Departamento ordenará que sea investigada, por inspectores del mismo Departamento, quienes asentarán en acta los detalles que constaten, y darán cuenta del resutado al Jefe respectivo.

Art. 12. Del resultado de la investigación a que se refiere el artículo anterior, el Jefe del Departamento podrá ordenar, si el caso lo amerita, el decomiso provisional de las semillas y plantas sobre las que haya recaído la investigación.

En caso de que el decomiso provisional sea resuelto definitivo, el Jefe del Departamento dispondrá de las semillas y plantas decomisadas, según lo estime conveniente.

Art. 13. El Jefe del Departamento mandará oír al infractor por el término de tres días hábiles, y concluidos, conteste o no, recibirá a prueba las diligencias por el término de ocho días. Vencido dicho plazo, resolverá lo procedente dentro del tercero día.

Art. 14. De la resolución anterior, podrá el interesado recurrir en apelación para ante El Ministro de Agricultura y Ganadería, debiendo interponer el recurso dentro del tercero día después de la notificación respectiva. El Ministro resolverá dentro de los cinco días posteriores de recibidas las diligencias, y de esta resolución no se admitirá ningún recurso.

Art. 15. Si la sanción consiste en multa, el infractor deberá enterarla en un plazo de quince días, después de que sea requerido para ello; y si no lo hiciere en ese témino, la multa se permutará por arresto hasta por treinta días, que cesará si aquél entera la multa.

CAPITULO V

DISPOSICIONES GENERALES

Art. 16. Los Inspectores del Departamento tendrán libre acceso a los predios agrícolas, locales, aduanas, puestos fronterizos y demás lugares en donde se produzcan, almacenen o expendan semillas o plantas certificadas o en proceso de certificación, cuando se dediquen a efectuar inspecciones propias del Departamento.

Art. 17. La persona que adquiera semillas o plantas cuya calidad no corresponda a la información contenida en la etiqueta de certificación deberá hacerlo del conocimiento del Departamento, para efectos de imposiciOn de las sanciones correspondientes. Quedará a salvo la acción de los interesados, conforme al derecho común, para las indemnizaciones a que haya lugar.

Art. 18. Cuando la producción de semillas y plantas sea realizada por el Ministerio de Agricultura y Ganadería, no perseguirá fines lucrativos y su venta deberá ser orientada en beneficio directo de los pequeños y medianos agricultores.

Art. 19. El Poder Ejecutivo en el Ramo correspondiente, emitirá los Reglamentos que fueren necesarios para la debida aplicación de esta Ley.

CAPITULO VI

DEROGATORIA Y VIGENCIA

Art. 20. Derógase el Decreto Ejecutivo N° 84, del 12 de septiembre de 1956, publicado en el Diario Oficial de esa misma fecha.

Art. 21. La presente Ley entrará en vigencia treinta días después de su publicación en el Diario Oficial.

DADO EN EL SALON DE SESIONES DE LA ASAMBLEA LEGISLATIVA; PALACIO NACIONAL: San Salvador a los dos días del mes de febrero de mil novecientos setenta y uno.

SALVADOR GUERRA HERCULES,
PRESIDENTE.

RUBEN ALFONSO RODRIGUEZ,
VICE-PRESIDENTE

ROGELIO SANCHEZ,
VICE-PRESIDENTE.

JULIO FRANCISCO FLORES MENENDEZ,
PRIMER SECRETARIO

ARMANDO MOLINA
PRIMER SECRETARIO.

JOSE FRANCISCO GUERRERO,
SEGUNDO SECRETARIO

CARLOS ARNULFO CRESPIN
SEGUNDO SECRETARIO

CASA PRESIDENCIAL: San Salvador, a los diez días del mes de febrero de mil novecientos setenta y uno.

PUBLIQUESE:

FIDEL SANCHEZ HERNANDEZ
PRESIDENTE DE LA REPUBLICA

ENRIQUE ALVAREZ CORDOVA
MINISTRO DE AGRICULTURA
Y GANADERIA

Publicado en el Diario Oficial N° 33, Tomo N° 230, de fecha 17 de febrero de 1971.

APPENDIX 8

REGLAMENTO PARA LA PRODUCCION Y COMERCIALIZACION DE SEMILLA CERTIFICADA DE MAIZ

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3º—Los expendedores están obligados a fijar en [illegible] indicando la capacidad y precio de venta que le corresponde para el consumidor según listado de precios que por este Acuerdo se fijan, y dar a publicidad dichos precios por medio de listas o carteles fijados en lugar visible de sus establecimientos, según los casos;

4º—Toda unidad para la venta de dichos productos de capacidad distinta a la fijada en este mismo Acuerdo debe ser autorizada por el Ministerio de Economía, y fijársele su precio previamente;

5º—Las municipalidades y los cuerpos de seguridad pública están obligados a velar por el cumplimiento de lo dispuesto en este Acuerdo. De las infracciones cometidas en el Departamento de San Salvador deberá informarse a la Dirección de Fomento y Control de Comercio Interno y Estudios de Mercado del Ministerio de Economía, y en los demás Departamentos, al Gobernador Político Departamental, quien deberá comunicarlo de inmediato a la Dirección antes citada.

6º—La alteración de estos precios será sancionada con multa hasta de veinticinco mil colones, de conformidad al Art. 4 de la Ley de Comercialización y Regulación de Precios;

7º—El Ministerio de Economía deberá analizar en forma permanente las variaciones de los costos de los factores que inciden en el precio de los productos del petróleo a que se refiere este Acuerdo, con el objeto de dictar y aplicar las medidas tendientes a obtener el abastecimiento mínimo requerido para el desarrollo normal de las actividades productivas del país;

8º—Los precios de los combustibles que adquiera el Gobierno, Municipalidades e Instituciones Oficiales Autónomas, serán fijados por convenios suscritos por los expresados organismos con las compañías distribuidoras de petróleo;

9º—El presente Acuerdo entrará en vigencia el día ocho de septiembre en curso. —Comuníquese. (Rubricado por el señor Presidente de la República). El Ministro de Economía, ORTIZ AVALOS. El Ministro de Hacienda, LOPEZ BERTRAND.

MINISTERIO DE AGRICULTURA Y GANADERIA

DECRETO Nº 60.

EL PODER EJECUTIVO DE LA REPUBLICA DE EL SALVADOR.

CONSIDERANDO:

I.—Que mediante Decreto Legislativo número 229 de fecha 10 de febrero de 1971, publicado en el Diario Oficial número 33, Tomo 230 del mes y año citados, se emitió la LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS, la cual en su artículo 19, faculta al Poder Ejecutivo para dictar los Reglamentos que fueren necesarios;

II.—Que con el objeto de asegurar el cumplimiento de la citada Ley, en su concepción general y en la parte relativa a la Producción y Comercialización de Semillas Certificadas de Maíz, preciso es emitir el Reglamento específico tendiente a normar dichas actividades.

POR TANTO,

en uso de sus facultades legales,

DECRETA el siguiente:

REGLAMENTO PARA LA PRODUCCION Y COMERCIALIZACION DE SEMILLAS CERTIFICADAS DE MAIZ

CAPITULO I

Objeto

Art. 1.—Este Reglamento tiene por objeto crear normas tendientes a:

1. Regular la producción, certificación y comercialización de semillas de maíz;
2. Garantizar el cumplimiento de la Ley de Certificación de Semillas y Plantas, que en adelante se llamará "La Ley", en cuanto a semillas de maíz se refiere;
3. Garantizar al usuario la pureza genética y calidad de la semilla que le expendan;
4. Garantizar el abastecimiento en el mercado interno de semilla de maíz y fomentar las exportaciones.

CAPITULO II

Glosario de Conceptos

Art. 2.—Para los efectos de aplicación del presente Reglamento, se considera:

1. *Florescencia o floración*: (Antesis) período o momento de la emisión de flores, o sea el período de distribución del polen.
2. *Autofecundación*: El polen de una planta determinada fecunda los óvulos de la misma planta.
3. *Cruza*: Acto de fecundar los gametos femeninos de un individuo con gametos masculinos procedentes de otro.
4. *Híbrido*: es la primera generación de la descendencia de una cruza entre dos individuos que difieren en uno o más caracteres.
5. *Línea Pura*: Grupo de individuos genéticamente puros, como resultados de la autofecundación.
6. *Cruza Simple o Híbrido Simple*: Es la primera generación del cruzamiento entre dos individuos (líneas puras o variedades).
7. *Cruza Doble o Híbrido Doble*: Es la primera generación del cruzamiento entre dos cruzas simples (de línea puras o variedades).
8. *Cruza Triple o Híbrido Triple*: Es la primera generación del cruzamiento entre una cruza simple y una línea pura o variedad.
9. *Híbrido Múltiple*: Cruzamiento entre más de cuatro líneas puras de distinto origen.
10. *Equilibrio Genético*: Condición en la generación sucesiva de una población: contienen los mismos genotipos en las mismas proporciones.
11. *Espiga (panícula)*: Se le denomina así a la inflorescencia masculina.
12. *Desespigamiento*: Remoción de la inflorescencia masculina antes de que derrame el polen.
13. *Jilote*: Espiga femenina sin granos formados y con los estigmas receptivos.

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14. *Plantas fuera de tipo*: Son las fenotipicamente diferentes, plantas muy precoces, muy tardías, plantas enfermas, y toda planta que no concuerda con las características descritas de la variedad.

15. *Semilla Hembra*: Es la línea pura, cruza simple o variedad que, según el caso, proporciona los óvarios para la fecundación.

16. *Semilla Macho*: Es la línea pura, cruza simple o variedad, según el caso, proporciona el polen para la fecundación.

17. *Semilla Básica*: Se consideran como semillas básicas las líneas puras y las cruzas simples que se emplean en la producción de maíces sintéticos e híbridos, así como las semillas de Fundación y Registradas que también se emplean para la producción de maíces, compuestos y otras variedades.

18. *Surco Macho o Hembra*: Es una o varias hileras sembradas con "semilla macho" o "semilla hembra", según el caso.

19. *Raleo de Plantas*: Supresión de plantas en exceso en la primera etapa de desarrollo, las cuales es preciso eliminar a fin de obtener una población normal.

20. *Variedad Compuesta o Compuesto*: Semilla básica obtenida combinando mecánicamente la semilla de dos o más líneas puras.

21. *Variedad Sintética*: Es la generación avanzada de una cruza múltiple de líneas puras o de los híbridos entre sí que han alcanzado un equilibrio genético a través de ciclos de recombinación.

22. *Generación Avanzada*: Es la subsiguiente generación después de la primera generación filial de una cruza simple, cruza doble, triple o cruza múltiple.

23. *M.A.G.*: Son las siglas del Ministerio de Agricultura y Ganadería.

CAPITULO III

INSTITUCIONES QUE INTERVIENEN EN LA APLICACION DE ESTE REGLAMENTO

Art. 3.—Para el cumplimiento del presente Reglamento intervienen las siguientes instituciones:

1. El Centro Nacional de Tecnología Agropecuaria (CENTA), a través de la División de Tecnología de Semillas especialmente y la División de Investigación Agropecuaria dando el soporte técnico.

2. Departamento de Defensa Agropecuaria, quien tendrá a su cargo la supervisión de los agroservicios para controlar las existencias y calidad de la semilla, autorizar permisos de importación de semilla de maíz desde el punto de vista cuarentenario.

3. Dirección General de Economía Agropecuaria, quien emitirá opiniones ante el Ministerio de Economía sobre los permisos de importación y exportación de semilla de maíz, previa consulta al Departamento de Defensa Agropecuaria y CENTA.

4. La Comisión de Semillas que en adelante se denominará La Comisión, tendrá a su cargo el estudio de los diferentes aspectos de la producción y comercialización de semillas de maíz certificado; y estará integrada por el Director General del CENTA quien actuará como Presidente de la Comisión, el Director General de Economía Agropecuaria y un representante por la Asociación de Productores de Semillas de El Salvador, y ~~habrá igual número de suplentes~~.

Presentación de las asociaciones de Productores Agropecuarios [illegible]

5. El Ministerio de Economía quien autoriza licencias de importación y exportación semilla.

CAPITULO IV

Producción

TITULO I

DE LOS REQUISITOS PARA SER PRODUCTOR, LICENCIAS Y PERMISOS

Art. 4.—Para ser productor de semilla certificada de maíz se necesita obtener la licencia que lo acredite como tal, la cual deberá ser extendida por el CENTA, con base en los siguientes requisitos:

1. Ser persona natural o jurídica con domicilio en El Salvador.

2. Poseer los conocimientos necesarios sobre la producción de semillas mejoradas, si atenderá el cultivo personalmente.

3. A defecto de estar personalmente calificado, deberá contratar a un profesional en agronomía o idóneo autorizado por la División, a cuyo cargo estará la dirección técnica durante la producción y proceso de la semilla.

4. Contar con las facilidades necesarias para calificarlo como productor permanente:

   a) Terreno adecuado;

   b) Maquinaria agrícola suficiente;

   c) Equipo de beneficiado adecuado al volumen de producción;

   d) Instalaciones de procesado y almacenamiento, incluyéndose un mínimo de bodega con ambiente controlado para conservar un 10% de su producción para el consumo local, durante un año por lo menos;

   e) Si el productor no cuenta con lo anteriormente indicado, deberá presentar contratos de arrendamiento o servicios, que le permitan cumplir con estos requisitos.

5. Presentar solicitud dirigida al Jefe de la División de Tecnología de Semillas y Plantas, en papel sellado de ₡ 0.30, conteniendo la siguiente información:

   a) Nombre y generales de la persona natural y si fuere persona jurídica, su denominación o razón social y además quién es su representante.

   b) Domicilio.

   c) Nombre, localización y extensión del inmueble donde efectuará el cultivo.

   d) Régimen de tenencia de la tierra.

   e) Facilidades del campo.

   f) Facilidades de beneficiado.

   g) Facilidades de procesamiento.

   h) Facilidades de almacenamiento.

   i) Nombre del profesional en agronomía o idóneo autorizado por la División, para dirección técnica de la producción.

Art. 5.—La solicitud deberá ser presentada a más tardar el 31 de julio del año anterior a la siembra, con los documentos necesarios anexos.

Dentro de los quince días subsiguientes al recibo de la solicitud, la División hará las inspecciones necesarias para su calificación; y no-

tificará su resolución al interesado, dentro de los 15 días posteriores a la conclusión de las inspecciones.

Previo al trámite deberá cancelar los derechos correspondientes.

Art. 6.—La Licencia de Productor caducará cada 5 años; y para refrendarla el productor deberá mantener un record de producción y disciplina que a juicio de la División, lo hagan acreedor a permanecer registrado como productor, además de someterse a lo que prescribe la Ley y este Reglamento.

Art. 7.—La obtención del permiso para siembra se hará anualmente y en base a los siguientes requisitos:

1. El productor deberá tener licencia de productor de semilla.

2. La solicitud deberá ser presentada en papel sellado de C 0.30, dirigida a la División de Tecnología de Semillas, de acuerdo al modelo que la misma le proporcione al interesado.

3. La solicitud deberá presentarse a más tardar el 31 de octubre del año anterior a la siembra y deberá contener la siguiente información:

a) Nombre y número de licencia del productor.

b) Nombre y número de la licencia del asesor técnico y/o de persona responsable.

c) Lugar y época de siembra.

ch) Régimen de tenencia de la tierra.

d) Cantidad de semilla que pretende producir de cada híbrido y/o variedad.

e) Cantidad de híbrido y/o variedad que destinará para el mercado interno, y para el mercado de exportación.

f) Area que pretende destinar a la producción de las cantidades de literales d) y e).

g) Compromiso de participar en el Banco de Reserva de Semillas, de acuerdo a lo estipulado en este Reglamento.

4. Disponer por lo menos de 35 hectáreas, para producir cruzas dobles o triples y variedades de polinización libre.

Art. 8.—Previo a la aprobación del permiso de siembra, el productor deberá cancelar los derechos correspondientes con base al área a sembrar y de acuerdo a las tarifas que anualmente el CENTA pondrá en vigencia.

TITULO II

REQUISITOS ESPECIFICOS PARA LA PRODUCCION DE SEMILLA DE LINEAS PURAS (SEMILLA DE FUNDACION); CRUZAS SIMPLES (SEMILLA REGISTRADA); CRUZAS DOBLES Y TRIPLES (SEMILLA CERTIFICADA).

Art. 9.—Las líneas puras estarán sujetas a los siguientes requisitos:

1. Fuente de Semilla:

a) Procederá de la semilla genética de líneas puras obtenidas por la División de Investigación del CENTA o de líneas puras desarrolladas por la iniciativa privada o importadas, en cuyos dos últimos casos, de acuerdo a lo establecido al respecto en este Reglamento (Título y Artículo V).

b) No se podrá usar como semilla la generación avanzada de la línea cosechada de los surcos "machos" (polinizadores) de cruza simple o cruza triple; excepto con permiso especial del Departamento de Certificación de Semilla, quien determinará si técnicamente puede otorgarse dicho permiso.

2. Métodos de Multiplicación.

Las líneas puras podrán multiplicarse por el método de control manual utilizando bolsas especiales para la autopolinización o, por el método de polinización natural en lotes perfectamente aislados, que garanticen la no contaminación de la semilla incrementada.

3. Terreno.

a) Selección del terreno: Deberá ser de buena calidad, de topografía plana, con buen drenaje, accesible en todo tiempo y que desde la última cosecha de maíz producido en él, hasta el día de la nueva siembra, haya transcurrido por lo menos un año, excepto si ha sido plantado con la misma línea pura. No obstante en este último caso, a fin de evitar la emergencia de plantas provenientes de la cosecha anterior, se recomendará prácticas de control que la División estime convenientes.

b) Aislamiento del terreno: si la multiplicación se hace por el método corriente de lotes aislados, el terreno seleccionado deberá estar completamente separado de cualquier otro terreno sembrado con maíz que florezca al mismo tiempo, por una distancia no menor de 800 metros. Esta distancia podrá ser reducida hasta 500 metros, cuando:

b.1 La polinización se haga controlada a mano.

b.2 El otro maíz se plante con una diferencia de tiempo que asegure la no contaminación de la línea pura, siendo en todo caso no inferior a 40 días.

Toda vez que el maíz, sujeto a posible contaminación, fuese de diferente color, habrá que mantener la distancia mínima permitida de 800 metros.

4. Eliminar plantas fuera de tipo:

Antes del período de Florescencia, deberán ser eliminadas todas las plantas fuera de tipo y las voluntarias. Para efectos de certificación, será descechado todo campo o lote de propagación que en la inspección durante la floración contenga más de 0.1% de plantas fuera de tipo y/o dudosas si el 2% de los estigmas ya son receptivos.

5. Secar la semilla:

Para asegurar su calidad y conservación, la semilla tendrá que secarse hasta un contenido de humedad no mayor de 10%.

Art. 10.—Las Cruzas Simples estarán sujetas a los siguientes requisitos:

1. Fuente de Semillas:

a) Provendrá de líneas puras certificadas, ya sean desarrolladas por el CENTA o por la iniciativa privada o de líneas puras importadas, en este último caso, de acuerdo a lo que al respecto se establece en este Reglamento (Título V).

b) No se podrá usar como semilla la generación avanzada de la línea macho (polinizador) de una cruza simple.

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2. Terreno:

a) Selección del terreno: debera ser de buena calidad, de topografía plana, de buen drenaje, accesible en todo tiempo y que desde la última cosecha de maíz plantada en el hasta el día de la siembra, haya transcurrido por lo menos, un año; caso contrario, a fin de garantizar la no contaminacion con plantas voluntarias, será obligacion del productor hacer las practicas de control necesarias que el Departamento de Certificación de Semilla aconsejé y cuantas veces este lo estime conveniente.

b) Aislamiento del terreno: el terreno seleccionado debera estar aislado de cualquier otro terreno cultivado con maíz (que no sea con la misma cruza simple de la misma formula genetica) por una distancia mínima de 400 metros. Esta distancia podra ser reducida hasta 50 metros cuando el otro cultivo haya sido plantado con una diferencia de tiempo que asegure la no contaminación del cruce, siendo en todo caso no inferior a 30 dias.

c) Aumentar la distancia: cuando el color de la cruza simple, sujeta a posible contaminación fuese de diferente color al maíz contaminante, la distancia de aislamiento tendrá que ser aumentada a 800 metros.

d) Parcelar el terreno: una vez aprobado el terreno, deberá ser parcelado en lotes no mayores de cinco manzanas (3.5 Ha.) y los surcos de las parcelas no tendrán más de 200 metros de longitud.

3. Identificar los surcos machos: durante la siembra los surcos machos deberán ser marcados en ambos extremos con señales perfectamente visibles y permanentes hasta la cosecha.

4. Eliminar plantas fuera de tipo: antes y despues de la florescencia deberan ser eliminadas todas las plantas fuera de tipo, ya sea que fuesen plantas voluntarias o mezclas mecanicas en la semilla sembrada. Para efectos de certificacion, será rechazado todo campo que en la inspección durante la floracion contenga más del 0.1% de plantas fuera de tipo o más del 1% de plantas dudosas, si el 2% de los estigmas de las plantas hembras ya son receptivos.

5. Desespigar correctamente las plantas hembras:

a) La eliminación de espigas en las plantas hembras debera hacerse *antes que derramen polen* y, desde que aparezca la primera hasta la última, sin suprimir en lo posible hojas terminales. Dicho desespigamiento se hará durante todo el periodo de floracion, manteniendo para ello los trabajadores necesarios aún en dias festivos.

b) Si como resultado de una inspección durante la floracion se determina un coeficiente mayor del 0.1% de espigas en las plantas hembras produciendo polen y si el 2% de los flores de las mismas plantas no estan aptas para ser polinizados, el campo o lote será desechado para efectos de certificacion. También será desechado para efectos de certificación el campo o lote que despues de otras inspecciones acumulen mas del 2% de espigas derramando polen.

c) Cuando una porción de espiga esté derramando polen ésta será considerada como espiga entera en antesis para el conteo.

6. Dobla de los surcos hembras.

a) Al llegar a la madurez fisiológica se procederá a la dobla de los surcos hembras, dejando en pie los surcos machos.

b) Durante la etapa de la dobla se considerara si la condición de la plantación amerita que se efectúe una precosecha; que consistiria en recolectar la mazorca hembra que está sujeta a dañarse durante el periodo de secamiento en la planta, es decir el periodo que transcurre desde la dobla hasta la cosecha de los surcos hembras.

c) La mazorca resultante de esta operacion se destusará inmediatamente y se secara en forma artificial antes del desgrane.

d) Estas operaciones especiales deberán ser aprobadas y supervisadas por el Departamento de Certificacion de Semilla.

7. Cosecha de los surcos machos.

Antes de cosechar los surcos hembras tienen que ser cosechados los surcos machos; la cosecha de éstos puede hacerse cuando sus mazorcas están verdes (en elote) o hasta la madurez, pero en cualquier caso, los rastrojos tienen que ser totalmente cegados y sacados fuera del lote que está en proceso de certificación.

En caso de que la eliminación de plantas machos pueda ser mecanizado, el Departamento podra aprobar y supervisar dicha actividad.

8. Sacar plantas y mazorcas caidas de los surcos hembras.

Antes de cosechar los surcos hembras, las plantas caidas con o sin mazorcas que estén completamente separadas del tallo, así como las mazorcas regadas por el suelo, tendrán que ser retiradas de dichos surcos hembras y no podrán utilizarse como semilla.

9. Dar aviso antes de cosechar los surcos hembras.

Los surcos hembras no podrán cosecharse sin la autorización del Departamento de Certificación de Semillas. El productor está obligado a dar aviso por lo menos seis dias antes de la recolección, pues, la cosecha no se iniciará sin la inspección previa y favorable del lote que se desea cosechar.

10. Secar la semilla cosechada.

Para asegurar tanto la calidad como su conservación, la semilla cosechada tendrá que ser secada hasta un contenido máximo de 10% de humedad.

Art. 11.—Las Cruzas Dobles y Triples estarán sujetas a los siguientes requisitos.

1. Fuente de Semilla:

Las cruzas simples y líneas puras a sembrarse, serán de las producidas por el CENTA o cruzas simples puras certificadas desarrolladas por la iniciativa privada o importadas; todo de acuerdo a lo dispuesto en este Reglamento.

2. Terreno:

a) Selección del terreno:

a.1 A fin de no comprometer el buen éxito del cultivo y asegurar las inspecciones del mismo, el terreno de

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berá ser accesible en todo tiempo, de topografía plana, con buen drenaje, de constitución física aceptable y laborable a máquina cuando las condiciones ambientales sean normales.

a.2 Que no se haya cosechado en dicho terreno ninguna clase de maíz durante un año anterior al día de la siembra; en caso contrario, a fin de evitar plantas voluntarias, será obligación del productor hacer las prácticas de control necesarias que el Departamento de Certificación de Semillas aconseje y cuantas veces éste lo estime conveniente.

b) Aislamiento del terreno: el terreno deberá estar completamente aislado de otro sembrado con diferente cultivo de maíz. La separación mínima en todos sus costados será de 200 metros, sin embargo, esa distancia podrá ser reducida:

b.1 Hasta 50 metros, si la plantación contaminante ha sido sembrada con una diferencia de tiempo no menor de 30 días.

b.2 Protegiendo las partes del lote expuesto a contaminación, con surcos del cruce simple masculino, que se llamarán surcos bordes, atendiendo a la siguiente escala.

Distancia en Metros	*Nº de Surcos Mascul. Bordes*
Mayor de 200 metros	0
Menor de 200 hasta 175	4
Menor de 175 hasta 150	6
Menor de 150 hasta 125	8
Menor de 125 hasta 100	10
Menor de 100 hasta 75	12
Menor de 75 hasta 50	14

Este sistema de aislamiento podrá ser aplicado solamente en caso que el color del grano de la plantación contaminante sea el mismo que el del lote de semilla; si el color es diferente, la distancia mínima de 200 metros tendrá que ser aumentada a 500 metros sin excepción alguna.

c) Parcelar el terreno: una vez aprobado el terreno, el lote o lotes de que conste, para efectos de mejor control, será subdividido en parcelas no mayores de 25 manzanas (17.5 Ha.). Asimismo, la longitud máxima de los surcos de siembra será de 300 metros.

d) Identificar los surcos machos: los surcos machos deberán ser marcados en ambos extremos con señales perfectamente visibles y permanentes hasta terminar la cosecha.

e) Eliminar plantas fuera de tipo: antes de la florescencia, deberán ser eliminadas todas las plantas fuera de tipo, ya sea que provengan de semilla pre-existentes en el terreno o de las semillas en cultivo.

También deberán ser eliminadas las plantas enfermas, las dudosas, las raquíticas, las muy precoces y las tardías, pues, para efectos de certificación, será desechado todo lote o campo que en una inspección durante la florescencia contenga más de 0.1% de plantas fuera de tipo o más de 2% de plantas dudosas, si el 5% de los estigmas de las plantas hembras son receptivos.

f) Desespigar correctamente las plantas hembras:

f.1 La eliminación de espigas en las plantas hembras deberá hacerse a medida que estas vayan apareciendo y *antes de que derramen polen*, sin suprimir en lo posible, hojas terminales. El desespigamiento se hará durante todo el período de floración manteniendo para ello el número necesario de trabajadores, aún en días festivos.

f.2 Todo campo o lote que en una inspección se le determine un coeficiente mayor de 1% de espigas de las plantas hembras *derramando polen* y si el 3% de estigmas (jilotes) de las mismas se encuentran aptos para ser polinizados, será desechado para fines de certificación. También será desechado todo campo o lote que después de varias inspecciones acumule más de 2% de espigas derramando polen en los surcos hembras.

f.3 Cuando una porción de espiga de una planta hembra esté derramando polen será considerada como espiga completa y se tomará en cuenta para el conteo.

g) Mantener limpia la plantación: A fin de no afectar la calidad de la semilla, todo campo o lote sembrado para obtener semilla, tendrá que mantenerse limpio, o sea libre de malezas primarias y secundarias, sobre todo a partir de la madurez fisiológica, o de la dobla hasta la cosecha.

h) Cosechar primero los surcos machos: antes de cosechar los surcos hembras, tienen que ser cosechados los surcos machos. La cosecha de éstos puede hacerse, si así se desea, cuando sus mazorcas estén verdes (en elote) o hasta la madurez, pero en cualquier caso los rastrojos tienen que ser totalmente segados y sacados fuera del lote en proceso de certificación.

i) Sacar plantas y mazorcas caídas de los surcos hembras: Antes de iniciar la cosecha de los surcos hembras, todas las plantas caídas con o sin mazorcas en los surcos hembras, plantas caídas con o sin mazorcas que estén completamente separadas del tallo, así como las mazorcas regadas por el suelo, tendrán que ser retiradas de dichos surcos hembras y no se tomarán en cuenta para certificación.

j) Dar aviso antes de cosechar los surcos hembras: Los surcos hembras no podrán cosecharse sin la debida autorización; por ello, el productor está obligado a dar aviso al Departamento de Certificación de Semilla por lo menos seis días antes de proceder a dicha cosecha.

k) Secar la semilla: para asegurar su conservación, la semilla cosechada tendrá que ser secada hasta un contenido de humedad del 11% como máximo.

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TITULO III

REQUISITOS ESPECIFICOS PARA LA PRODUCCION DE SEMILLA DE VARIEDADES DE POLINIZACION LIBRE (SINTETICAS, COMPUESTAS Y OTRAS VARIEDADES)

Art. 12.—Las variedades de polinización libre estarán sujetas a los siguientes requisitos:

1. Fuente de Semilla:

Para variedades sintéticas, compuestas y otras variedades mejoradas de polinización libre, la semilla provendra de semilla de Fundación, Registrada o Certificada de Semilla Original o Básica desarrollada por el CENTA o por la iniciativa privada, o importada, todo de acuerdo o lo que al respecto establece este Reglamento.

2. Selección del Terreno:

A fin de no afectar el buen desarrollo del cultivo y asegurar las inspecciones del mismo, el terreno deberá ser accesible en todo tiempo, de topografía plana, con buen drenaje y adecuadas caracteristicas físicas. Además deberá parcelarse en lotes no mayores de 17.5 Ha. (25 manzanas).

3. Aislamiento del terreno:

Deberá estar completamente separado de cualquier otro terreno sembrado con maiz extraño, según la categoria de semilla a producir, así:

Fundación	500 metros
Registrada	300 metros
Certificada	200 metros

Para la semilla de fundación, la distancia de 500 metros podrá reducirse hasta 50 metros, cuando:

a) La polinización se hace controlada a mano.

b) Entre la siembra del lote para semilla y la siembra del maiz extraño han transcurrido por lo menos 30 días o más de diferencia, según el caso.

c) Para la semilla registrada y semilla certificada, la distancia de 300 metros y 200 metros podrá reducirse hasta 50 metros, cuando:

c.1 Los respectivos lotes para semilla se han sembrado por lo menos 30 días antes o después de los maices extraños que puedan contaminarse.

c.2 Al tiempo de la cosecha se dejan fuera de certificación determinado número de surcos bordes que hayan servido como barrera contra la contaminación, atendiendo a la siguiente escala:

Distancia en Metros	Número de Surcos Semilla Registrada	Semilla Certificada
Mayor de 300	0	—.—
Menor de 300 hasta 250	4	—.—
Menor de 250 hasta 200	8	0
Menor de 200 hasta 150	12	6
Menor de 150 hasta 100	16	10
Menor de 100 hasta 50	18	14

4. Eliminación de plantas fuera de tipo:

Antes de la floresceucia deberan eliminarse las plantas fuera de tipo, pues, todo campo o lote que en una sola inspección contenga mas plantas fuera de tipo o dudosas que los porcentajes a continuación señalados, será desechado para efectos de certificación:

	Fundación	Registrada	Certificada
Plantas fuera de tipo	0%	0.5%	1%

5. Secar la semilla:

La semilla cosechada tiene que ser secada hasta reducir su contenido de humedad al 11% ó menos.

TITULO IV

REQUISITOS COMUNES A LINEAS PURAS, CRUZAS SIMPLES, CRUZAS DOBLES, CRUZAS TRIPLES Y VARIEDADES DE POLINIZACION LIBRE (SINTETICAS, COMPUESTAS Y OTRAS VARIEDADES)

Art. 13.—Además de los requisitos especificos establecidos en los articulos 9, 10 y 11 de este Reglamento, para las lineas puras, cruzas simples, cruzas dobles, triples y variedades de polinización libre, deberan cumplir los siguientes requisitos:

1. Terreno y Siembra:

a) Preparar bien el terreno. El terreno de siembra deberá ser bien preparado, arando y rastreando tantas veces como fuese necesario, a fin de procurar a la semilla una cama de siembra adecuada.

b) Avisar sobre la fecha de siembra. El productor deberá dar aviso al Departamento de Certificación de Semilla, seis días antes de la fecha en que iniciará la siembra.

c) Limpiar la máquina sembradora: antes de iniciar la siembra la máquina sembradora (caso de usarse) deberá estar completamente exenta de semillas extrañas y, cuando se usare para cruzas simples, dobles o triples, los depósitos para semilla macho y hembra se identificaran en forma segura a fin de evitar mezclas al ser llenados.

d) Iniciar la siembra con la presencia del Inspector: Toda siembra deberá iniciarse en presencia de un inspector del Departamento de Certificación de Semillas, quien se cerciorará de la identidad de la semilla a sembrarse y comprobará si se ha cumplido con los requisitos previos a la siembra y dictará las medidas necesarias para asegurar la normal ejecución de la misma, la cual continuará siendo supervisada periódicamente.

2. Prácticas Culturales:

a) Fertilizar adecuadamente: Es necesario la buena fertilización de acuerdo a los resultados de un análisis de suelo.

b) Mantener la plantación libre de malezas: en beneficio de la calidad de la semilla y de la sanidad del cultivo, la plantación deberá mantenerse libre de

malezas desde la siembra hasta la cosecha y así también evitara la competencia de dichas malezas con el maíz en cuanto a humedad, nutrimentos y luz solar.

Toda forma de eliminar las malezas es aceptable siempre que no vaya en perjuicio de la semilla de maíz.

c) Raleo: El raleo debera efectuarse entre los diez y quince días después de la siembra, lo cual en condiciones anormales se puede posponer a criterio del Inspector.

d) Efectuar buen control de insectos: Las plagas deberán ser controladas desde la preparación del suelo hasta la cosecha de la semilla.

e) Selección dentro del lote: Previamente a la florescencia se hará una eliminación final de toda planta indeseable.

f) No sembrar cultivos intercalados: No se permitirá cultivos intercalados ni en asocio en los lotes de producción de semillas.

g) Muestreo de mazorcas: Previamente a la cosecha en cada lote se hará un muestreo al azar de las mazorcas producidas para determinar su calidad promedio.

3. Cosecha:

a) Tomar precauciones durante la cosecha:

El Productor está obligado a tomar toda clase de precauciones antes y durante la cosecha a fin de que el manejo, transporte y almacenaje temporal de la semilla se ejecute dentro de la mayor seguridad, evitando así mezclas o confusiones con otros maíces que puedan modificar la garantía de pureza genética de la semilla sujeta a certificación. En todo caso, las operaciones de cosecha se sujetarán, invariablemente a las normas que indique el inspector.

b) Seleccionar las mazorcas cosechadas: Las mazorcas cosechadas deberan ser seleccionadas a mano, eliminando todas las que estén fuera de tipo, dañadas por insectos, hongos y virus, así como por sequía (granos dormidos), granizo o deficiencias de nutrición, y las mazorcas con semilla de otro color.

4. Beneficiado o Procesamiento.

a) Beneficiar o procesar la semilla: La semilla deberá ser beneficiada o procesada adecuadamente; para ello será necesario disponer del equipo mínimo siguiente: equipo de desgrane adecuado para semilla, secadora mecánica o patios especiales y amplios; máquina limpiadora o máquina clasificadora-limpiadora, la cual deberá tener las zarandas o cedazos adecuados; máquina tratadora para aplicar sustancias fungicidas e insecticidas; máquina para coser los envases.

b) Limpiar el equipo de procesamiento: Antes de dar principio al procesamiento de la semilla, tanto la secadora o patios, la desgranadora, clasificadora, tratadora, elevadores, transportadores, tanques y envases provisionales, deberán estar perfectamente limpios y exentos de granos de otras cosechas y principalmente de granos de otra semilla de maíz.

c) Atender las siguientes indicaciones sobre el beneficiado: *Secado*: Si la semilla se cosecha durante la estación lluviosa no podrá ser almacenada en ninguna de sus formas (en tuza, mazorca o grano) sin previo secamiento artificial. Si la cosecha se hace en la época seca, el secamiento puede hacerse a máquina o en patios.

Cualquiera de los métodos que se use (ya sean en mazorca o en granos) la semilla tiene que ser secada hasta reducir su humedad a los límites anteriormente establecidos para líneas puras, cruzas simples, cruzas dobles, o triples, o variedades de polinización libre. Si se usa patio para secar la semilla, debe de ser amplio y estar perfectamente limpio y libre de cualquier otra semilla de maíz con la que pudiera haber mezcla. Este sistema solamente podrá usarse si se toman todas las precauciones necesarias y con autorización del Departamento de Certificación de Semillas.

Desgrane: La máquina deberá estar ajustada de tal manera que se reduzca a un mínimo de 5% los granos quebrados, para que puedan ser eliminados mecánicamente durante el procesamiento.

Limpieza: Por medio de la limpieza se eliminará a máquina, todas las materias extrañas a la semilla, tales como piedra, tierra, deshechos vegetales, tamo o ajuate, etc.

Clasificación: La clasificación es necesaria y obligatoria para obtener un producto uniforme y se deberá ejecutar a máquina, generalmente al mismo tiempo que la limpieza, separando la semilla por su forma y tamaño.

Por su forma, la semilla puede ser plana o redonda, indefectiblemenae la semilla fina tiene que ser eliminada, usando obligatoriamente una zaranda de agujeros circulares de 17/64" de diámetro; dicha semilla no es certificable. Para la separación de los granos planos de los redondos hay que considerar el espesor promedio de los granos planos y usar zarandas de agujeros oblongos de 13/64" x 3/4; 14/64" x 3/4" ó 15/64" x 3/4" según el caso. Separado el grano plano del redondo, el plano debe someterse a una separación mínima, así:

Grano Grande: todo el que es retenido por una zaranda de agujeros circulares de 21/64" de diámetro o de mayor diámetro, según la variedad.

Grano mediano: todo el que pasa a través de una zaranda de agujeros circulares de 21/64" o de mayor diámetro, según la variedad pero que es retenido por una zaranda de agujeros de 19/64" de diámetro, según la variedad.

Grano pequeño: todo el que pasa a través de una zaranda de agujeros circulares de 19/64" o de mayor diámetro según la variedad, y es retenido por una zaranda de 17/64" de diámetro.

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El productor, si así lo desea, puede clasificar el grano redondo en grande, mediano y pequeño, usando las zarandas adecuadas, lo mismo que puede ajustar más, con equipo especial, la clasificación del grano plano por espesor y longitud.

Para efectos de certificación, la tolerancia de los grupos y denominaciones descritas u otras que se declaren, es de 5%.
Si de acuerdo a la variedad, el productor usa zarandas de medida diferente a las anteriormente señaladas, está en la obligación de hacerlo del conocimiento del Departamento de Certificación de Semillas para su aprobación. El CENTA podrá variar las medidas si nuevos híbridos lo requieren.

Tratamiento: La semilla deberá ser tratada con una sustancia fungicida en polvo, líquido o suspensión acuosa, para protegerla contra hongos en su período anterior y posterior a la siembra. Además deberá contener un colorante adecuado que identifique a la semilla como tratada.

d) Envasar adecuadamente:

d.1 Durante el beneficiado, para asegurar la no contaminación con semillas extrañas, deberán usarse envases nuevos temporales de cualquier material que soporte el constante manipuleo.

d.2 Para el almacenaje definitivo, la semilla tiene que ser envasada en envases nuevos y de material adecuado, lo suficientemente resistentes al manejo para evitar posibles roturas. Estos envases podrán ser de 25, 50, 100 ó más libras de capacidad y una vez llenados tienen que cerrarse con costura a máquina o sellados a calor o por otro medio según el caso, que garantice que no se contamine la semilla.

d.3 Cada envase deberá llevar impreso en forma visible, las indicaciones siguientes, las cuales deberán ser aprobadas previamente por la División.

1) Peso neto.

2) Identificación de la semilla.

3) Nombre del productor.

4) Marca según registro en el Departamento.

5) Leyenda "Semilla Certificada Producida en El Salvador".

6) Prevención: indicar en forma destacada que no es apta para consumo humano ni animal.

d.4 Cualquier modificación que se haga al envase tendrá que ser autorizada por la División.

5. Condiciones mínimas de almacenamiento.

a) Temporalmente, mientras dure el beneficiado, la semilla puede depositarse en bodegas corrientes pero secas, sin infiltraciones de agua ni humedad y libres de insectos, por un lapso de tiempo que no pase de 60 días.

b) Almacenamiento previo durante el procesamiento. La semilla podrá almacenarse durante un período máximo de 90 días, en envases o a granel, en bodegas corrientes pero secas, sin infiltraciones de agua ni humedad, libre de insectos y en condiciones de temperatura y humedad que no permitan que la semilla se deteriore.

c) La semilla procesada, lista para comercializarse durante el próximo año agrícola, podrá mantenerse envasada o a granel en bodegas que además de tener las características del literal anterior (B) ofrezcan condiciones que permitan que la semilla no se deteriore en un período máximo de ocho meses, siempre y cuando el período no pase del 30 del mes de junio de la temporada agrícola de ese año.

d) La semilla que se almacena durante períodos más largos que lo estipulado en los literales anteriores, y la semilla que el productor tenga en existencia al 30 de junio, inmediatamente posterior a la época de ventas, deberá permanecer en bodega con ambiente controlado, adecuado, que permita mantenerla en buenas condiciones.

e) Almacenamiento de reservas: deberá observarse lo indicado en el literal d).

f) Acondicionar aparatos deshumedificadores y enfriadores de aire en las bodegas de almacenaje prolongado, especialmente para el 10% de la cosecha.

g) Mantener identificada la semilla en lotes no mayores de 200 quintales: cada lote de semilla embodegado tiene que permanecer perfectamente identificado con una etiqueta grande, colocada de tal manera que no sea fácil su extravío.

6. Muestreo.

a) Todo lote de semilla procesada y envasada, será muestreada por el Departamento de Certificación de Semilla para su análisis oficial en el Laboratorio de Semillas del citado Departamento; las muestras serán de un kilogramo.

b) Para efectos de muestreo, todo lote de semilla procesada y envasada será estibado en columnas no mayores de veinte bolsas, de tal manera que se pueda introducir en cualquier bolsa, un muestreador de doble tubo; o en su defecto, el productor estará obligado a facilitar el muestreo, moviendo los envases según indicaciones del inspector, a fin de obtener una muestra representativa.

TITULO V

DE LA CERTIFICACION DE LINEAS PURAS, CRUZAS SIMPLES, CRUZAS DOBLES Y TRIPLES; PRODUCIDAS O IMPORTADAS POR LA EMPRESA PRIVADA Y OTRAS INSTITUCIONES ESTATALES FUERA DEL CENTA

Art. 14.—Producción e Importación.

a) *Producción*: Toda semilla de maíz producida por la iniciativa privada u otro organismo estatal, con fines de incrementación o comercialización, deberá ser previamente autorizada por el Departamento de Certificación de Semillas y Plantas de la División de Tecnología de Semillas del CENTA.

b) *Importación*: La importación deberá ser autorizada por el Ministerio de Economía previa consulta al M.A.G. Posteriormente refrendada por el Departamento de Defensa Agropecuaria.

Art. 15.—Previo a la autorización referida en el artículo 14 de este Reglamento, el interesado deberá presentar solicitud ante el Jefe de la División de Tecnología de Semillas en papel sellado de ₡ 0.30 en la que esté contenida la siguiente información:

a) Nombre comercial de la variedad (o si se trata de una línea, cruza simple, doble, triple, o mestizo, sintético, compuesto, cruce intervarietal, etc.).

b) Tipo y color del grano.

c) Origen, o sea las fuentes de germoplasma de donde se deriva el material, grado de endocría de las líneas, y grado de endogamia. No necesario el pedigree cerrado.

d) Origen geográfico.

e) Días a floración (masculina y femenina), tanto en siembras de estación seca como lluviosa.

f) Días a madurez fisiológica y días a cosecha.

g) Altura media de planta y mazorca.

h) Grado resistencia o tolerancia a enfermedades, insectos, acame, roya, Phylocora, Physoderma, achaparramiento.

i) Porcentaje de plantas con dos o más mazorcas.

j) Epoca de siembra y densidad recomendada (plantas por hectárea).

k) Potencial de rendimiento (Ton./ha.).

l) Aclarar si dicha semilla ha estado con anterioridad en el mercado.

m) Detalle de las características fenotípicas de la planta y de la semilla que produce.

n) Evidencia de la productividad, por medio de datos comparativos de los rendimientos.

ñ) Señalamiento detallado de las áreas geográficas de adaptación de la semilla.

o) Detalle de los procedimientos y planes necesarios para mantener los tres tipos de semilla (básica, registrada y certificada).

p) Detalle del porcentaje de plantas objetables (fuera de tipo) que puedan presentarse en un ciclo de producción.

q) Especificar las restricciones respecto a las áreas que se puedan destinar a la producción de semilla, u otros factores que el Fitomejorador crea necesario dar a conocer, que ayudan a mantener la pureza de la semilla.

r) Facilitar una muestra representativa de semilla, tal como se conocería en el mercado.

s) En caso de semilla proveniente del extranjero, deberá presentarse la certificación, en la categoría correspondiente, por el Organismo Oficial de certificación de semilla del país de origen, cuyas normas de certificación no deberán ser inferiores a las adoptadas en El Salvador.

Art. 16.—En caso de no haber evidencia de la productividad de una semilla importada o desarrollada por la empresa privada, dicha semilla deberá ser evaluada por el interesado bajo la supervisión del CENTA, o por el CENTA directamente, todos los costos serán por cuenta del solicitante.

Art. 17.—Una vez aprobada la semilla para someterla a certificación, toda la fase de producción será controlada por el Departamento de Certificación de Semilla, desde la selección del terreno hasta la cosecha, beneficiado, muestreo y pruebas de laboratorio; o sea que todo el proceso de certificación será sometido a las normas reglamentarias existentes.

Art. 18.—Durante la fase de producción, y para efectos de certificación, se tomarán como parámetros de campo las características fenotípicas y agronómicas descritas por los creadores de la semilla. Ello implica que todo material que se aparte del fenotipo establecido para ese material será eliminado para certificación.

Art. 19.—Las instituciones o empresas autorizadas para producir la semilla de fundación, por ellos desarrolladas, debe contar con un genetista aceptado por la División de Tecnología de Semillas.

Art. 20.—Para la producción de semilla de fundación, registrada o certificada, se considerarán tres registros, a saber:

1º) El Registro de Productores.

2º) El Registro de Campo de Producción.

3º) El Registro de las semillas que se depositen en las plantas almacenadoras.

Art. 21.—Las instituciones o empresas autorizadas para producir bajo certificación, semilla de fundación o semilla registrada, o ambas a la vez, deberán almacenar dichas semillas en la Planta Almacenadora del CENTA, en el caso de que no cuenten con facilidades de almacenamiento adecuadas, el costo de tal servicio correrá por cuenta del productor.

Art. 22.—El control a que se refiere el artículo anterior se llevará por medio de un tarjetero de entradas y salidas, en que se autoricen las áreas a sembrar. Las nuevas incrementaciones que ingresen a las bodegas serán agregadas a las semillas ya existentes, para su completo y garantizado control.

CAPITULO V

ANALISIS, TOLERANCIA Y CERTIFICACION DE SEMILLA DE MAIZ

Art. 23.—Determinaciones en el Laboratorio de Semillas.

Los análisis oficiales para certificar semilla de maíz, serán hechos en el Laboratorio de Semilla del Departamento de Certificación de Semillas, dichos análisis comprenderán las siguientes determinaciones:

a- % de germinación.

b- % de humedad.

c- % de semilla pura.

d- % de semilla de otros cultivos.

e- % de materia inerte.

f- % de semilla de maleza primaria y secundaria.

a- Prueba de germinación: se realiza en semilla pura a base de 400 semillas replicadas cuatro veces (100 semillas por réplica), colocadas dentro de una cámara con humedad relativa controlada a 28ºC, al cuarto día se hará la primera lectura y la segunda o final se hará al séptimo día, tomando en cuenta, en ambas lecturas, solamente plántulas normales.

a.1 Todo lote de semilla ya certificada se le harán pruebas de germinación, así:

segunda prueba: al vencimiento de la primera etiqueta, el cual quedará a criterio de la División.

tercera prueba: tres meses después de la segunda.

a.2 Si en la tercera prueba, la germinación no es inferior a 85%, las pruebas siguientes se harán cada tres meses. Si en la primera, segunda o tercera prueba la germinación es de 80% o muy ligeramente superior a este límite, las pruebas subsiguientes se harán, a juicio del Departamento de Certificación de Semillas, antes del tiempo anteriormente señalado.

b- Prueba de pureza: Se realizará en 500 gramos de la muestra de cada lote, colocando dicha muestra sobre una zaranda de agujeros circulares de 12/64" de diámetro. Todo material que pase dicha zaranda y materias extrañas de mayor tamaño que no la pasen; así como los granos completamente podridos, constituyen materia inerte. La semilla pura estará constituida por los granos o pedazos de granos con embrión que queden sobre la zaranda.

El resultado final, tanto de materia inerte como de semilla pura, se dará en porcentaje (%) en relación a la muestra.

c- Prueba de humedad: Se realiza en semilla pura (determinada en muestra remitida en envase a prueba de escapes de humedad, usando cualquier método (generalmente en aparatos electrónicos), siempre y cuando el aparato usado esté calibrado por el método estandard de la prueba al horno, durante una hora a 130°C. Cualquiera que sea el método ajustado que se use en la determinación, el resultado se dará en porcentaje (%) en relación al peso de la muestra requerida.

Art. 24.—Entrega de Resultados: Los resultados obtenidos de las diferentes pruebas de laboratorio serán entregados a los interesados diez días después de la toma de la muestra, siempre que ésta haya sido tomada de lunes a jueves de la semana y doce días después si la muestra fuese tomada en días viernes

Art. 25.—Para efectos de cualquier reclamo o comprobación posterior, el Laboratorio de Semillas guardará las muestras de semillas analizadas, por un período no menor de seis meses contados a partir de la fecha de entrega del resultado del análisis.

Art. 26.—Normas de Calidad: Toda semilla de maíz sujeta a certificación deberá cumplir con las siguientes normas de calidad que aparecerán en el marbete de certificación:

	Línea Pura	*Cruza Simple*	*Cruza Doble*	*Var. Polinización Libre*
Germinación mínimo	70%	80%	80%	80%
Semilla pura mínimo	99%	99%	90%	90%
Materia inerte máximo	1%	1%	1%	1%
Semilla malas hierbas máximo	0%	0%	0%	0%
Otras variedades máximo	0%	0%	0%	0%
Otros Cultivos máximo	0%	0%	0%	0%
Granos dañados (picado, quebrado, etc)	1%*	1%*	1%*	1%*

* Estos porcentajes son en relación a número de granos.

Art. 27.—Etiquetado y Marchamado: Todos los envases que contengan semilla certificada de maíz para la venta, deberán ser etiquetados y marchamados con los marbetes y sellos metálicos que la División de Tecnología de Semilla del CENTA estime conveniente, dichas etiquetas y sellos deberán ser colocados ante la presencia de un inspector de Certificación de Semilla.

Art. 28.—Las etiquetas para semilla certificada deberán ostentar en forma visible la denominación de la categoría correspondiente que, en su orden de pureza genética, se distinguirán por su color así:

Blanca: Para semilla de fundación o líneas puras.

Morada: Para semilla registrada o cruza simple.

Azul: Para semilla certificada.

Roja: Para semilla certificada de inferior calidad.

Art. 29. Las etiquetas color rojo se usarán en la semilla certificada, en los casos siguientes:

a —Cuando en el siguiente ensayo o análisis la semilla con etiqueta azul, por cualquier motivo, resulte con un porcentaje de germinación más bajo de 80% y mayor del 70%.

b —Cuando, aún poseyendo la pureza o genuinidad genética, la semilla no reuna los demás requisitos reglamentarios para ostentar la etiqueta azul.

Art. 30. Los marchamos y etiquetas de certificación serán adquiridos por el Departamento de Certificación de Semillas, para ser proporcionados a cada productor de semilla de maíz, debidamente registrado, previo al pago de los derechos correspondientes.

Art. 31. El Departamento de Certificación de Semilla indicará la manera de fijar a cada envase los marchamos y etiquetas de certificación.

CAPITULO VI

Comercialización

Art. 32. La Dirección General de Economía Agropecuaria determinará la demanda interna anual de semilla certificada, para el año posterior al que se haya sembrado la semilla; y tendrá como bases tanto investigaciones de campo sobre superficie a sembrarse para consumo así como tendencias de venta. Además se deberá tener estimada la proyección de requerimientos de superficie para el subsiguiente. Tal determinación no pasará del 31 de octubre de cada año.

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Art. 33. Establecida la demanda interna anual, la Dirección General de Economía Agropecuaria y CENTA, asignarán cuotas tanto para el mercado interno como para exportaciones a cada uno y todos los productores, de acuerdo a los permisos de siembra autorizados por el CENTA. En caso de que la suma de los volúmenes individuales indicados para el consumo local en tales permisos, no sea suficiente para cubrir la demanda estimada, se realizará ajustes de acuerdo al siguiente mecanismo:

a) Los agricultores que hayan producido la totalidad de sus compromisos internos, se le reducirá el saldo exportable correspondiente en la cuantía que haya fallado.

b) Si aplicando la medida anterior no se cubre toda la demanda se consultaría a los productores si están en posibilidades de comprometerse a incrementar la siembra para cubrir el faltante estimado.

c) Si no hubiere solución a dicho problema, el M. A. G. reducirá lo destinado a exportaciones en la proporción que cada agricultor participe en la producción total.

Art. 34. La Comisión, tomando como base estudios de mercado de la Dirección General de Economía Agropecuaria determinará volúmenes de reserva de semilla de maíz, para afrontar imprevistos. Tal volumen no será menor que el 10 por ciento de la demanda interna y será depositado en bodegas del CENTA debidamente certificada bajo condiciones adecuadas de temperatura y humedad relativa. Esta semilla reservada y almacenada por cada productor, forma parte del Banco de Reserva de Semilla, y el costo del servicio de almacenamiento será cubierto por el productor.

Art. 35. En la Constitución de la referida reserva en el Art. 34, participarán todos los productores en la forma que lo hayan declarado para obtener los permisos. Si la suma de lo declarado por cada uno y todos los productores no alcanza para garantizar el mercado nacional, se procederá a realizar ajustes a las cantidades que los productores deberán destinar para el mercado interno; y si llegado a este punto no hubiere acuerdo, la Dirección General de Economía Agropecuaria establecerá cuotas en forma proporcional a la participación en el mercado interno.

Art. 36. La Dirección General de Economía Agropecuaria realizará conjuntamente con el CENTA balances sobre producción y demandas internas, las cuales ajustarán oportunamente de acuerdo a variaciones en la disponibilidad de semillas que están en condiciones adecuadas para sembrarse. Con base en este balance, la Dirección General de Economía Agropecuaria podrá emitir opiniones ante el Ministerio de Economía sobre solicitudes de exportaciones.

Art. 37.—Para resolver solicitudes de exportación en base a los permisos de siembra autorizados por el CENTA, la Dirección General de Economía Agropecuaria tomará en cuenta los excedentes exportables de años anteriores, la producción de la siembra de verano del ciclo agrícola anterior, la reserva de semillas y la producción de siembra de invierno del ciclo agrícola en curso, deduciéndole la demanda interna y la reserva de semilla.

Art. 38.—Las cuotas de exportación serán preliminares y definitivas. Las primeras serán determinadas con base a permisos de siembras y vencerán el último día de febrero de cada año; y las segundas se establecerán el primer día hábil de marzo en base a disponibilidades y demandas previstas para el mercado local.

Art. 39.—La comercialización interna deberá cumplir con los siguientes requisitos:

a) Las ventas de semilla de maíz se harán en envases debidamente autorizados por CENTA.

b) La venta de semilla de maíz será realizada en establecimientos autorizados por el Departamento de Defensa Agropecuaria.

c) Todo productor o distribuidor proporcionará información a la Dirección General de Economía Agropecuaria sobre movimientos de ventas al mercado interno cuando le sea solicitada dicha información; y de exportaciones cada vez que se realicen en el formulario correspondiente.

ch) Todo distribuidor autorizado antes de poner en venta la semilla de maíz, deberá solicitar al Departamento de Certificación de Semillas la recertificación de la semilla que tenga etiquetas vencidas.

d) Todo productor que haya puesto en venta semilla de maíz y que no haya sido vendida al 30 de junio de cada año, deberán retirar dicha semilla para su debido almacenamiento. Antes de ofrecerla en venta nuevamente deberá recertificarla.

Art. 40.—El control de las exportaciones de semilla de maíz, lo realizará la División de Tecnología de Semillas del CENTA, y con la colaboración de Defensa Agropecuaria, para garantizar al importador la autenticidad y calidad de la semilla certificada.

Art. 41.—Toda semilla certificada, antes de su importación tendrá que ser autorizada por el Departamento de Certificación de Semillas, según lo establecido en este Reglamento.

CAPITULO VII

De los Inspectores de Certificación de Semilla

Art. 42.—Los Inspectores del Departamento de Certificación de Semillas del CENTA tendrán las siguientes funciones:

1º) Supervisar todas las fases de la producción.

La supervisión a que se hace referencia se ejercerá haciendo la visita preliminar a las facilidades de campo, beneficiado y almacenamiento con que pueda contar el solicitante a productor, o a los productores ya registrados. También hacer visitas a los campos escogidos para su debida aprobación. Hacer visitas al campo antes y durante la siembra; después de la siembra; antes y durante el desespigue; antes y durante la cosecha; antes y durante el beneficiado; toma de muestras y supervisar la colocación de etiquetas y marchamos.

2º) Visitar y controlar las bodegas donde se almacenen las semillas certificadas o en proceso de certificación, y los establecimientos comerciales donde se expendan al público semillas certificadas, todo con el fin de garantizar la venta de semillas de buena calidad.

3º) Visitar aduanas marítimas o terrestres, lo mismo que puestos fronterizos por donde se importen o exporten semillas certificadas.

4º) Tomar muestras de semillas en proceso de certificación o ya certificadas; ya sean estas últimas producidas en el país o importadas.

5º) Decomisar las semillas que a simple vista se encuentren profusamente atacadas por insectos, y todas aquellas que, previo análisis de la muestra correspondiente, se determine que su calidad, es inferior a las normas máximas y mínimas de laboratorio establecidas.

6º) Levantar las actas correspondientes cuando se trate del decomiso provisional o definitivo de semillas de mala calidad.

7º) Efectuar las investigaciones respecto a infracciones a la Ley o a este Reglamento.

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CAPITULO VIII

Prohibiciones

Art. 43.—Queda especialmente prohibido:

1º) No atender las indicaciones que dé el Departamento de Certificacion de Semillas a traves de sus Inspectores en relación al uso y manejo que deba darse a la semilla de un lote eliminado para fines de certificación.
2º) Poner en circulación semilla con etiquetas de certificación, cuando en realidad no hayan sido certificadas.
3º) Separar o destruir con o sin malicia, o alterar total o en parte las etiquetas o marchamos de certificacion.
4º) Traficar con semillas cuyas especificaciones no correspondan con las que se indiquen en la etiqueta respectiva.
5º) Ofrecer a la venta semillas certificadas que no presenten la etiqueta o el marchamo de certificación correspondiente, o que se encuentren atacadas por insectos o que su calidad germinativa se encuentre bajo el porcentaje mínimo de certificación reglamentario.
6º) Distribuir o expender semillas no certificadas en envases diseñados y aprobados exclusivamente para el expendio de semillas certificadas.
7º) Usar en semillas no certificadas, etiquetas o marchamos similares a los que se aplican solamente a las semillas certificadas.
8º) Trasegar semillas ya certificadas o aptas para certificación, sin el permiso previo del Departamento. Caso de concederse dicho permiso todo trasiego deberá realizarse en presencia de un inspector del Departamento.
9º) Exportar semillas certificadas del país, en envases que no sean los previamente aprobados por el Departamento.
10º) Importar o exportar semillas certificadas en contravencion a lo dispuesto en la Ley o este Reglamento.
11º) Sin el permiso previo del Departamento de Certificación de Semillas, no se podrá hacer uso en la exportación o comercio interno, de expresiones tales como: "Semillas Inspeccionadas", "Semillas Controladas" u otros equivalentes que puedan inducir al usuario a error o engaño acerca del verdadero origen o buena calidad de las semillas: bien sea en los envases que las contengan, en etiquetas o en folletos que se agreguen a las mismas: en anuncios, circulares o por cualquier medio de difusión o propaganda.

CAPITULO IX

Sanciones

Art. 44.—Toda infracción a la ley o a este Reglamento, será sancionada con multa de cien a un mil colones, según la gravedad del caso.

Art. 45.—Las infracciones reglamentarias durante el cultivo, cosecha o beneficiado, serán penadas con la eliminación del lote afectado en el terreno, o del lote de semillas ya beneficiada.

Art. 46.—En el comercio serán decomisadas todas aquellas semillas importadas que se pongan a la venta como certificadas, sin llenarse los requisitos que la ley o el Reglamento establecen.

Art. 47.— 1) También serán decomisadas todas las semillas certificadas, importadas o producidas en el país, que se encuentren en los expendios visiblemente atacadas por insectos, y las que como resultado de análisis previo, se encuentren fuera de los requisitos de calidad normalmente establecidos.

2) En todos los casos en que se encuentren semillas certificadas de dudosa calidad, el Departamento mandara tomar las muestras oficiales para determinar la calidad de las semillas supuestamente fuera de lo normal.

3) En caso necesario, el Departamento de Defensa Agropecuaria podrá ser auxiliado por el Departamento de Certificación de Semillas del CENTA, comunicando al primero los lugares en que hayan detectado semillas de dudosa calidad.

Art. 48.—Si un productor no cumple con las producciones estipuladas en sus permisos de siembra por causas imputables a él, la División de Tecnología de Semillas estará facultada para limitar sus siembras al área que esté en capacidad de manejar adecuadamente.

Art. 49.—Si un productor no está en capacidad de comercializar adecuadamente la totalidad de su produccion, al grado de que sus excedentes constituyan una carga económica para el Departamento de Certificación de Semillas, o que estos excedentes constituyan un peligro para el desarrollo de la industria, la División de Tecnología de Semillas estará facultada para limitar sus áreas de siembra. Las areas podrán ser aumentadas nuevamente en la medida que el productor demuestre estar en capacidad de comercializar adecuadamente.

Art. 50.—El Departamento de Certificación de Semilas suspendera definitivamente o por el tiempo que se estime conveniente la licencia de operación de aquellos productores importadores, o vendedores de semillas certificadas que en forma reiterada infrinjan las disposiciones de la Ley o del Reglamento.

Art. 51.—El procedimiento para imponer las sanciones sera el establecido por la Ley en su Capitulo IV, articulos, 11, 12, 13, 14 y 15.

Art. 52.—El presente Decreto entrará en vigencia ocho dias después de su publicación en el Diario Oficial.

DADO EN CASA PRESIDENCIAL: San Salvador a los trece dias del mes de septiembre de mil novecientos setenta y nueve.

CARLOS HUMBERTO ROMERO,
Presidente de la República.

José Rutilio Aguilera Carreras,
Ministro de Agricultura y Ganadería

PODER JUDICIAL

CORTE SUPREMA DE JUSTICIA

Acuerdo Nº 75-D.—Corte Suprema de Justicia: San Salvador veintisiete de septiembre de mil novecientos setenta y nueve.

El Tribunal ACUERDA: autorizar al doctor Manuel de Jesús Cruz, para que ejerza la profesión [illegible] en vista de haber resuelto por esta Corte en el expediente respectivo —Comuníquese y publíquese. — Chávez. — Rivera — Castellanos. — Villacorta. — Chavarría. — Hernández C. — Arrieta G. —Olmedo. — Alvergue. Pronunciado por los señores Magistrados que lo suscriben. — Ernesto Rivera G.

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APPENDIX 9

NUMBER AND TYPE OF INSPECTIONS PERFORMED BY THE DEPARTMENT OF SEED CERTIFICATION

1. Inspection of requirements for produce seeds - approval of producer.
2. Inspection of seed production site or land for producing seed.
3. Inspection during planting to ensure proper planting techniques, number of plants, and proper identification of male and female rows.
4. Inspection after planting.
5. Inspection prior to flowering.
6. Inspection during flowering to determine number and percent of female tassels shedding pollen.
7. Inspection prior to harvesting female parent to observe proper identification and techniques.
8. Inspection during selection or sorting of ears.
9. Inspection and control of storage.
10. General overall inspection of facilities and operations.
11. Notification before "stop-sale" if sees do not meet standards.
12. Notification of "stop-sale" - those seeds will be destroyed.

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APPENDIX 10

PROPOSED LEY DE CERTIFICATION DE SEMILLAS Y PLANTAS

DECRETO No -----

LA ASAMBLEA LEGISLATIVA DE EL SALVADOR

CONSIDERANDO:

I. Que la semilla es un insumo estratégico.

II. Que el progreso de la agricultura esta intimamente vinculado con el empleo de semillas y plantas mejoradas de óptima calidad genética y física.

III. Que tanto el sector público como el privado, a través de investigaciones técnico-científicas, han logrado obtener variedades mejor a das de especies vegetales que aventajan significativamente a las cultivadas en el país, tanto en redimiento, adaptabilidad y otras características agronómicas deseables.

IV. Que es necesario aprovechar los resultados de esas investigaciones en beneficio de los agricultores, por lo tanto, la producción y comercialización de semillas y plantas deben estar respaldadas por una legislación adecuada para garantizar la calidad y pureza de las mismas.

POR TANTO:

En uso de sus facultades legales, y a iniciativa del Ministerio de Agricultura y Ganadería,

DECRETA LA SIGUIENTE:

"LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS"

CAPITULO I

OBJETIVOS

Art. 1 La presente ley tiene como objetivos:

a) Garantizar la identidad genética y calidad superior de las semillas y plantas certificadas, y otras cuyo destino sea insumo agrícola.

b) Fomentar la producción de semillas y plantas certificadas el uso en el mercado interno y la exportación.

c) Diversificar e incrementar la producción agrícola nacional, mediante el uso de semillas y plantas certificados de nuevas especies.

d) Sancionar y ejecutar cualquier infracción a esta ley o a sus reglamentos.

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CAPITULO II

DISPOSICIONES PRELIMINARES

Art. 2 El Ministerio de Agricultura y Ganadería, para lograr el cumplimiento de los objetivos propuestos en esta Ley, controlará y certificará las semillas y plantas, de superior calidad producidas en el país o importadas, delegando esta atribución a la División de Certificación de Semillas y Plantas, que en adelante se le denominará "Organismo Certificador".

Art. 3 Para la formulación, coordinación y seguimiento de la política de producción y comercialización de semillas y plantas certificadas, y todas aquellas que sean para insumos agrícolas se crea la Comisión Nacional de Semillas, que en adelante se le denominará "La Comisión", la cual estará integrada por un Presidente y un Secretario, cargos que ocuparán el Director General del CENTA y el Director General de Economía Agropecuaria respectivamente y por dos representantes de la Asaciación de Productores de semillas de El Salvador (ASPRODES) que fungiran como vocales.

El funcionamiento de la Comisión será normada por el Reglamento interno respectivo.

CAPITULO III

DEFINICIONES

Art. 4 Para los efectos de esta ley se entenderá por:

a) Semilla: Todo grano, tubérculo, bulbo o cualquier parte viva del vegetal que se use para reproducirse.

b) Planta: Vegetal originado de la semilla.

c) Semilla o Planta Certificada: Las producidas bajo la supervisión del Organismo Certificador, y para cuya obtención se han llenado los requisitos exigidos por esta Ley, los Reglamentos y Normas Específicas para su certificación.

d) Planta Matriz: Planta adulta debidamente registrada y evaluada que sirve como fuente de yemas para la propagación y formación de un Vivero Registrado.

e) Vivero: Lugar de reproducción de especies botánicas originarias de una Planta Matriz, ya sea por semillas, esqueje, rizoma, cepa, bulbo, tubérculo, acodo, injerto, etc.

f) Semilla Genética: Es la semilla producida por el fitomejorador.

g) Semilla Básica: Es la que se obtiene como resultado de la multiplicación directa de la semilla genética.

h) Semilla Registrada: Es la progenie de la semilla básica.

i) Semilla Certificada: Es la progenie de semilla básica o registrada.

j) Semilla Mejorada: Es la que se obtiene siguiendo las técnicas recomendadas para su producción y cuya pureza genética se desconoce o no esta definida.

k) Registro de Certificación: Dependencia del Organismo Certificador para la inscripción de las variedades de semillas y plantas certificadas, productores autorizados, fincas de producción, plantas beneficiadoras, expendios, importadores y exportadores.

l) Fitomejorador: Científico especialista en mejoramiento genético de semillas.

m) Inspector: Técnico capacitado y autorizado para realizar todas las actividades de certificación y control legal.

n) Marchamo: Sello de seguridad que por su diseño solo puede ser usado correctamente una vez; para la certificación de semillas y/o plantas.

o) Etiqueta: Marbete puesto al envase o empaque que contiene la semilla o a la planta que se certifica, en la cual se indica su categoría, especie, variedad, datos de calidad y demás especificaciones que sirvan para identificarla.

p) Productor: Persona natural o jurídica que cumple con los requisitos de Ley para la producción y comercialización de semillas y/o plantas certificadas.

q) Beneficiador: Persona natural o jurídica que de acuerdo a la Ley, está autorizado para prestar servicio de acondicionamiento.

CAPITULO IV

ATRIBUCIONES Y FUNCIONES

Art. 5 Son atribuciones y funciones del Organismo Certificador

a) Velar por el cumplimiento de esta Ley, sus Reglamentos y Normas Específicas.

b) Llevar un registro de la semilla genética y plantas matrices producidas en el país o que se introduzcan.

c) Mantener un registro de los productores autorizados, fincas de producción, plantas de acondicionamiento de semillas, importadores, exportadores, expendios de semillas o plantas certificadas y marcas comerciales en coordinación con otros organismos estatales.

d) Realizar muestreos de semillas y los correspondientes análisis y determinaciones de laboratorio, de acuerdo a los métodos establecidos por la Asociación Internacional de Análisis de Semillas (AIAS).

e) Inspeccionar los campos de producción de semillas y/o plantas, sitios de acondicionamiento y cualesquiera otras instalaciones que el Organismo Certificador estime conveniente.

f) Proveer a los productores e importadores las etiquetas y marchamos de certificación previo al pago de derechos respectivos.

g) Supervisar la adecuada colocación de etiquetas y marchamos en los envases o plantas certificadas.

h) Aprobar los envases para la comercialización de semillas certificadas.

i) Conceder licencia de productor y/o beneficiador a las personas naturales o jurídicas que deseen dedicarse a la producción de semilla y/o plantas, previa aprobación de la Comisión Nacional de Semillas.

j) Efectuar las invetigaciones respecto a la violación de esta ley y su reglamento, normas específicas y tramitar las diligencias correspondientes e imponer las sanciones respectivas.

CAPITULO V

DE LA PRODUCCION Y COMERCIO

Art. 6 La semilla básica y plantas matrices producidas por el Ministerio de Agricultura y Ganadería son patrimonio nacional.

Art. 7 Para producir semilla básica y plantas matrices el ESTADO dispondrá de los terrenos de su propiedad en el Ramo de Agricultura y Ganadería; y de acuerdo a los medios contractuales legalmente establecidos, podrá producir en aquellos terrenos que reúnan los requisitos específicos reglamentarios para la producción de semilla certificada prevaleciendo sobre cultivos vecinos contaminantes.

Art. 8 Las personas naturales o jurídicas, autorizadas podrán dedicarse a la producción y venta de semillas y/o plantas certificadas siempre que reunan los requisitos exigidos por esta Ley, Reglamentos y Normas Específicas.

Art. 9 Todo productor deberá cancelar los derechos de inspección a los campos de producción, lugares de acondicionamiento, análisis de laboratorio y los correspondientes marchamos y etiquetas de certificación, los cuales serán revisados y ajustados anualmente por el Organismo Certificador.

Art. 10 Para la importación y exportación de semillas y/o plantas certificadas se deberá, presentar solicitud ante los organismos correspondientes, quienes pedirán la opinión del Ministerio de Agricultura y Ganadería, especialmente del Organismo Certificador cuando se trate de productos objeto de su programa de certificación.

Art. 11 Las semillas y plantas importadas, de las especies que estan dentro de los programas de certificación del MAG, deberán estar certificadas en la categoría correspondiente por el organismo competente del país de origén, cuyas normas no sean inferiores a las nacionales y seran certificadas en su pureza física y poder germinativo por el Organismo Certificador de acuerdo a las normas locales vigentes.

Art. 12 Para poder comercializar internamente todo lote de semilla rechazado para fines de certificación se pondrán de acuerdo el productor y el Organismo Certificador para su destino final.

CAPITULO VI

PROHIBICIONES

Art. 13 Queda especialmente prohibido:

a) Traficar con semillas y/o plantas cuyas especificaciones no correspondan con las que se indiquen en la etiqueta respectiva.

b) Separar, destruir y alterar en forma total o parcial, las etiquetas o marchamos de certificaión.

c) Traficar con semillas o plantas que estén atacadas por plagas y/o enfermedades, o que su período de vencimiento haya caducado.

d) Usar para semillas y plantas certificadas, etiquetas y/o marchamos no autorizados por el Organismo Certificador.

e) Traficar con semillas no certificadas, en envases que sean los aprobados exclusivamente para el expendio de semillas certificadas.

f) Trasegar semilla certificada de envases deteriorados a otros en buen estado, sin la autorización previa. Caso de concederse dicha autorización, todo trasiego deberá realizarse en presencia de un inspector.

g) Expender semillas certificadas, en envases que no sean los aprobados por el Organismo Certificador.

h) Desatender las indicaciones que emanen del Organismo Certificador, en relación al uso y manejo que debe darse a la semilla de un lote rechazado para fines de certificación.

i) Usar las expresiones: Semilla "Controlada", Semilla "Inspeccionada" u otra similar para la venta de semilla que no sean las establecidas en la presente ley.

j) La venta o trAfico de grano con apariencia de semilla certificada.

k) Impedir el libre acceso a los predios agrícolas y a todos aquellos lugares donde se encuentren semillas y/o plantas certificadas o en proceso de certificación.

l) La siembra de cultivos que constituyan un contaminante de acuerdo a las normas específicas de protección de semilla básica de patrimonio estatal.

CAPITULO VII

DE LAS SANCIONES Y EL PROCEDIMIENTO PARA EJECUTALAS

Art. 14 Cualesquiera infracción a esta ley, su reglamento y normas específicas se sancionará con multas de Un mil colones, a diez mil colones, según la gravedad de la infracción, sin perjuicio de la facultad de proceder al decomiso provisional o definitivo de las especies.

Art. 15 Cuando se trate de reincidencia a las causales comprendidas en los literales del a) a la k) del art. 13 de esta ley y sus reglamentos, exceptuando el l); la suspención de la licencia de operación, ya sea persona natural o jurídica, será definitiva.

Art. 16 Al tener conocimiento de una infracción a la presente ley, su reglamento y normas específicas, el Jefe del Organismo Certificador ordenará su investigación y el levantamiento del acta respectiva, debiendo proceder al decomiso temporal de las especies que motivaron la investigación, si el caso lo amérita.

Art. 17 Si del acta se dedujera que ha habido infracción, el Jefe del Organismo Certificador mandará a oir al presunto infractor, por el término de tres días hábiles y concluído dicho término, conteste o no, recibirá a pruebas las diligencias por el término de ocho días. Vencido este último plazo, resolverá lo procedente dentro del tercer día.

Art. 18 De la resolución anterior, podrá el interesado recurrir en apelación ante el Ministro de Angricultura y Ganadería, debiendo interponer el recurso dentro del tercer día después de la notificación respectiva. El Ministro resolverá dentro de los cinco días posteriores de recibidas las diligencias, y de esta resolución no se admitirá ningún recurso.

En caso de que el decomiso provisional es resuelto definitivo, el Organismo Certificador dispondrá de las semillas y/o plantas decomisadas según lo estime conveniente.

Art. 19 Si la sanción consiste en multa, el infractor deberá entregarla en un plazo de 15 días, después de que sea requerido para ello; y si no lo hiciera en este término, la multa se permutará por arresto por treinta días, que cesará si áquel cubre la multa.

CAPITULO VIII

DISPOSICIONES GENERALES

Art. 20 El personal técnico del Organismo Certificador, tendrá libre acceso a los predios agrícolas, aduanas, puestos fronterizos y demás lugares en donde beneficien, almacenen y expendan semillas y/o plantas certificadas o en proceso de certificación, cuando se dediquen a efectuar inspecciones propias de la actividad.

Art. 21 Las personas que adquieran semillas y/o plantas cuya calidad no correspondan a la información contenida en la etiqueta de certificación, deberá hacerlo del conocimiento del Organismo Certificador, para la inmediata investigación y a efectos de las sanciones correspondientes. Quedará a salvo la acción de los interesados, conforme el derecho común para las indemnizaciones a que haya lugar.

Art. 22 La producción de semillas y plantas certificadas, realizadas por el Ministerio de Agricultura y Ganadería, deberá ser destinada preferentemente a satisfacer la demanda nacional de semilla básica y registrada, a efecto de garantizar la producción de semillas comerciales certificadas.

Art. 23 El poder ejecutivo en el Ramo de Agricultura y Ganadería emitirá los reglamentos que fueran necesarios para la debida aplicación de esta ley.

CAPITULO IX

DEROGATORIA Y VIGENCIA

Art. 24 Derógase el Decreto Legislativo No. 229, del 2 de febrero de 1971, publicado en el Diario Oficial No. 33, Tomo 230 del 17 de febrero de 1971.

Art. 25 La presente ley entrará en vigencia trenta días después de su publicación en el Diario Oficial.

DADO EN EL SALON DE SESIONES DE LA ASAMBLEA LEGISLATIVA. San Salvador, a los _____ kIas del mes de _____ de mil novecientos noventa y uno.

PALACIO LEGISLATIVO. San Salvador, a los _____ días del mes de _____ de mil novecientos noventa y uno.

PUBLIQUESE

bga/04-15-91

APPENDIX 11

PROPOSED REGLAMENTO GENERAL DE LA LEY DE CERTIFICATION DE SEMILLAS Y PLANTAS

REGLAMENTO GENERAL
DE LA
LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS

DIVISION DE CERTIFICACION DE SEMILLAS Y PLANTAS

MINISTERIO DE AGRICULTURA Y GANADERIA

San Andrés, enero de 1991

DECRETO N°_____

EL GOBIERNO DE LA REPUBLICA DE EL SALVADOR

CONSIDERANDO:

1- Que por Decreto N° _____ de fecha _____ publicado en el Diario Oficial N° _____, Tomo N° _____ del mes y año citados se emitió nueva Ley de Certificación de Semillas y Plantas, la que en su Art. _____ faculta al Poder Ejecutivo en el Ramo, para dictar los Reglamentos que fueren necesarios.

11- Que con el objeto de asegurar la aplicación de la Ley citada en el anterior considerando, debe emitirse el Reglamento General que desarrolle las disposiciones contenidas en ella.

POR TANTO:

En uso de sus facultades legales,

DECRETA, el siguiente:

"REGLAMENTO GENERAL"

DE LA

LEY DE CERTIFICACION DE SEMILLAS Y PLANTAS.

CAPITULO I

OBJETIVOS

Art. 1 El presente Reglamento tiene por objetivos:

a) Desarrollar las disposiciones contenidas en la Ley de Certificación de Semillas y Plantas, que en el texto de este Reglamento se denominará "La Ley", a fin de facilitar la interpretación y aplicación de la misma.

b) Sentar las bases para el desarrollo de las Normas Específicas de semillas y/o plantas.

c) Garantizar al usuario la autenticidad de las semillas y plantas certificadas, y otros atributos, tal como lo establece la Ley.

CAPITULO II

DIVISION DE CERTIFICACION

Art. 2 La División consta de las siguientes secciones:

a) Registro

b) Inspectoría

c) Laboratorio de Semillas

Art. 3 En la Sección de Registro se realizarán las siguientes actividades:

a) Registro de variedades y plantas certificables; productores de semilla y viveristas; fincas de producción; huertos y viveros autorizados; plantas beneficiadoras de semillas; distribuidores, importadores; almacenes y marcas comerciales.

b) Suministro y control de etiquetas y marchamos.

c) Control de todas las actividades relacionadas con el proceso de certificación.

Art. 4 La Sección de Inspectoria la componen el cuerpo técnico de inspectores autorizados para la aplicación de la Ley, Reglamento y Normas de certificación de semillas y plantas.

Art. 5 Los Inspectores de la División tienen las siguientes funciones:

a) Inspeccionar los campos de producción, locales de procesamiento y beneficios de semilla, bancos de yemas y viveros de plantas autorizadas por la División.

b) Asesorar a los ejecutores de los programas de producción y procesamiento de semillas y plantas, sobre la aplicación de las

Normas de Certificación, y la interpretación de la Ley y sus Reglamentos.

c) Comprobar y verificar las tolerancias y requisitos de campo y de procesamiento, en la producción de semillas y/o plantas para certificación.

d) Inspeccionar las semillas y plantas certificadas o en proceso de certificación en las bodegas donde se almacenan, en el comercio donde se expenden al público, y en las adunas y puestos fronterizos por donde se importen o exporten.

e) Desautorizar las etiquetas y mantener control sobre aquéllas semillas en que halla caducado la garantía del análisis, hasta obtener el resultado de una nueva prueba que determine su calidad.

f) Retirar etiquetas y marchamos a los lotes de semillas y/o plantas certificadas, que previo análisis de la muestra correspondiente, se determina que ha bajado su calidad y no cumple los requisitos mínimos de certificación y a aquellos lotes que a simple vista se notaran atacados por insectos y/o enfermedades.

g) Presenciar la destrucción de las semillas enunciadas en el literal anterior, sus envases, marchamos y etiquetas, y levantar el acta correspondiente.

h) Investigar las violaciones a la Ley o sus Reglamentos.

i) Autorizar las etiquetas después de verificar los datos en ella impresos con los resultados de los análisis de laboratorio, y comprobar si corresponden a los lotes de semillas o plantas a certificar.

j) Supervisar la colocación de etiquetas y marchamos en la certificación de semillas y plantas.

Art. 6 El Laboratorio de Semillas es el encargado de realizar los análisis correspondientes con fines de certificación, o sobre cualquier clase de semillas.

Art. 7 Los analistas del Laboratorio de la División realizarán las siguientes actividades.

a) Tomar muestras oficiales de la semilla certificada o en proceso de certificatión, producida en el país o importada.

b) Realizar ensayos en el Laboratorio, de acuerdo a las Reglas Internacionales para análisis de semillas.

CAPITULO III

CATEGORIAS DE SEMILLA O PLANTAS ELEGIBLES

Art. 8 Las categorías que estarán bajo el control de la División serán:

a) Semillas: Basica
Registrada
Certificada
Mejorada

b) Materiales Vegetativos:
Semillas y yemas Registradas
Plantas comerciales certificadas.

Art. 9 Serán semillas y plantas elegibles para certificación:

a) Las desarrolladas o introducidas al país por el Ministerio de Agricultura y Ganadería.

b) Las producidas por empresas particulares, a partir de la semilla Registrada, desarrollada por el Ministerio de Agricultura y Ganadería.

c) Las desarrolladas o importadas por empresas particulares y que, a solicitud de éstas, sean aprobadas por la División.

Art. 10 Las variedades que liberen los Fitomejoradores Nacionales, con fines de certificación, deberán reportarse a la División con la siguiente Información:

a) Especie y variedad

b) Origen y procedimientos fitotécnicos utilizados en su desarrollo.

c) Descripción completa y detallada de la morfología, que permita diferenciarla de otras variedades.

d) Evidencia de su capacidad de rendimiento, tolerancia a insectos y/o enfermedades y otras características agronómicas.

e) Zonas de adaptación.

f) Métodos de multiplicación y procedimientos a seguir para el mantenimiento de la semilla básica y el número de generaciones que se puede incrementar a partir de ella.

g) Manejos especiales requeridos para mantener la pureza en la producción de la variedad.

h) Cualquier información adicional que sea de importancia para el proceso de certificación.

Art. 11 La semilla genética, cuando sea liberada por el Fitomejorador, no podrá mantenerse en la categoría de básica por un número indefinido de incrementaciones; por lo tanto se establecerá el máximo de generaciones de incrementación permisibles para dicha categoría en las Normas Específicas de cada cultivo.

Art. 12 Las semillas desarrolladas o importadas por empresas particulares, tendrán que someterse a evaluaciones específicas en los campos experimentales del Ministerio de Agricultura y Ganadería, por el tiempo necesario para su aprobación, y los costos de estas evaluaciones en su totalidad serán por cuenta del interesado.

Art. 13 Las semillas o plantas importadas no serán evaluadas si previamente no están certificadas en la categoría correspondiente, de acuerdo a lo exigido por la Ley. Esta certificación deberá estar autenticada por el Funcionario Consular de El Salvador en el país de origen.

CAPITULO IV

PRODUCTORES

Art. 14 Pueden ser productores de semillas y plantas, en todas sus categorías, el Ministerio de Agricultura y Ganadería; otras Instituciones Estatales, y personas naturales o jurídicas que cumplan con la Ley y sus Reglamentos. Sin embargo las semillas genéticas y de fundación producidas por el Ministerio de Agricultura y Ganadería, serán patrimonio exclusivo de esta Institución.

Art. 15 Requisitos para ser Productor:

a) Ser persona natural o jurídica con domicilio en El Salvador.

b) Poseer conocimientos técnicos sobre producción de semillas y/o plantas certificadas, y en caso de no atender el cultivo personalmente deberá contratar a un técnico en producción o a un Idóneo calificado, previa participación en programas de capacitación sobre la interpretación y aplicación de las Normas y Reglamentos.

c) Contar con las facilidades de terreno, maquinaria, instalaciones y equipo de beneficiado adecuado al cultivo y/o clase de semillas o plantas a certificar. Si no cuenta con lo anteriormente indicado, deberá presentar a la División, contratos de arrendamientos de servicios que le permitan cumplir con estos requisitos.

CAPITULO V

LICENCIA PARA SER PRODUCTOR

Art. 16 Para obtener licencia de productor de semillas o plantas certificadas deberá presentarse una solicitud por escrito a la División, en el papel sellado correspondiente, la cual debe

redactarse de acuerd con lo especificado en el formulario que se proporcionará al solicitante. Dicha solicitud debe presentarse con seis meses de anticipación a la época de siembra.

Art. 17 Dentro de los quince días subsiguientes al recibo de la solicitud, se harán las inspecciones necesarias para su calificación, y cinco días después, de acuerdo al resultado de éstas, la División podrá otorgar o denegar la licencia.

Art. 18 La licencia de producción tendrá una validez de tres años, pero anualmente se deberá presentar la solicitud de siembra respectivapara la autorización de los capos de producción.

Art. 19 Una vez caducada la licencia de productor se refrendará mediante la presentación de una nueva solicitud y la aplicación de lo establecido en los Artículos 16 y 17 de este Reglamento.

Art. 20 Se suspenderá la licencia y se cancelará el registro de la marca comercial al productor que infrinja la Ley o sus Reglamentos.

CAPITULO VI

INSPECCIONES

Art. 21 Los campos de producción, beneficiados, almacenes, bancos de yemas y viveros serán supervisados por los inspectores durate el proceso de certificación de semillas y plantas; por cada inspección se llenará un formulario en triplicado, en el que se anotarán las observaciones e indicaciones específicas, que deberá ser firmado por el responsable de la actividad y el inspector.

Art. 22 Si al verificarse la inspección no se encuentra presente el responsable de la actividad, bastará la firma del inspector, y si fuese posible la de cualquier persona que constate la presecia de éste.

Art. 23 Del formulario mencionado anteriormente, el original será conservado por la División, duplicado será remitido posteriormente por correo al productor y el triplicado quedará en el lugar de la inspección.

Art. 24 Cuando las inspecciones se realicen en lugares de venta, aduanas y otros, se procederá conforme a lo estipulado en el Art. anterior, y el duplicado se enviará al intersado.

CAPITULO VII

PRODUCCION

Art. 25 Para la siembra e instalación de viveros para la producción de plantas y semillas registradas y comercial certificada, la solicitud

tendrá que presentarse a la División con cinco meses de anticipación a la fecha del establecimiento del cultivo, especificándose dónde estarán ubicados los campos de producción.

Art. 26 El terreno debe ser accesible en toda época, de topografía adecuada al cultivo, fértil, con buen drenaje y con facilidades de riego. En caso de semillas cada especie y tipo de cultivo debe contar con el aislamiento necesario, de acuerdo a las Normas Especificas.

Art. 27 Toda actividad de siembra, trasplante, injerto y otras de tipo agronómico que incidan en la calidad de la semilla o planta, deberá hacerse en presencia de un inspector.

Art. 28 Enlos campos de producción no se permitirá cultivos intercalados o en asocio, si tal práctica interfiere en la actividad de las inspecciones, laboreo y cosecha, o afecte la calidad de la semilla o planta a producir.

Art. 29 Todo campo de producción de semillas deberá permanecer libre de malezas y de plantas de otra variedad, especie, atípicas y anormales, en base a las tolerancias establecidas en las Normas Específicas (las cuales podrán moficarse, si la aplicación de nuevas técnicas comprobadas lo permite).

Art. 30 La siembra, cosecha, procesamiento de la semilla, selección de plantas esquejes y yemas, debe iniciarse con la autorización previa de un inspector, la cual deberá solicitarse a la División con la debida antelación.

Las instalaciones, equipo, herramientas, envases de manipuleo u otros que se utilicen, debe estar libres de contaminantes que afecten la pureza y calidad de la semilla o plantas en proceso de certificación.

Art. 31 Cuando se determine que un lote de producción de semillas y/o plantas no alcanzan los límites de tolerancia permisibles en las Normas Específicas de producción, se rechazará para fines de certificación.

CAPITULO VIII

PLANTAS, BENEFICIADORAS, DE SEMILLA

Art. 32 Para obtener licencia de Beneficiador de Semillas deberá presentarse una solicitud por escrito a la División, en el papel sellado correspondiente, la cual debe redactarse de acuerdo a lo especificado en el formulario que se proporcionará al solicitante.

Art. 33 Las plantas beneficiadoras de semilla podrá ser de dos classes: estatales o privadas, y de acuerdo a este Reglamento deberán estár registradas en la División.

Art. 34 De las privadas la División reconoce dos tipos: primero las que administran los mismos productores; y segundo las que instalan y manejan personas dedicadas solamente al beneficiado y almacenamiento de semillas.

Art.35

a) Toda semilla, previo a la certificación, deberá beneficiarse según lo establece el Reglamento Específico correspondiente.

b) Instalaciones y maquinaria suficiente para beneficiar y almacenar, por lo menos el producto del área mínima de cultivo establecida en los Reglamentos Específicos, en el caso de los beneficios de semilla que administran los mismos productores y en mayor escala en el caso de los beneficios dedicados exclusivamente a la prestación de este servicio.

c) Maquinaria y equipo indispensable:

- Clasificadora de Precisión para granos
- Limpiadoras a presión de aire
- Tratadora automática en húmedo
- Báscula con capacidad mínima de un quintal
- Equipo para análisis de semilla
- Maquina cosedora

Art. 36 Las plantas beneficiadoras de semillas funcionarán de la siguiente manera:

a) Las de los productores, bajo la responsabilidad de ellos mismos

b) Las de los particulares, bajo la responsabilidad de sus propietarios, que en el texto de este Reglamento se llamarán "Beneficiadores".

c) Los beneficiadores prestarán sus servicios a los productores bajo contrato escrito, del cual una copia deberá presentar el productor a la División, junto con la solicitud de siembra.

d) Dicho contrato contará además con una cláusula donde el beneficiador se compromete a garantizar al productor, durante el beneficiado, la conservación de la identidad, calidad y pureza de la semilla, y su preservación en el almacenamiento.

e) El proceso de beneficiado y almacenamiento se realizará siguiendo lo exigido por este Reglamento y la Normas Específicas.

CAPITULO IX

MUESTREO Y ANALISIS DE SEMILLAS

Art. 37 Toda muestra de un lote de semillas en proceso de certificación o certificada, deberá ser tomada por técnicos del laboratorio oficial de semillas de la División, las cuales tendrá carácter oficial.

Art. 38 El muestreo para certificación se realizará únicamente en semillas que se encuentren debidamente beneficiadas, envasada y estibadas, según lo determine la División.

Art. 39 Los lotes muestreados, no podrán moverse del lugar donde se tomó la muestra, hasta tener conocimiento del resultado de los análisis.

Art. 40 Todo lote rechazado para fines de certificación, podrá muestrearse nuevamente a solicitud del productor o propietario si el factor que determinó el rechazo puede ser superado técnicamente.

Art. 41 Los análisis oficiales de semillas certificadas, o en processo de certificación, solamente serán efectuados en el laboratorio de la División.

Art. 42 Los procedimientos y métodos para análisis, pruebas y determinaciones oficiales serán las señaladas por las "Reglas Internacionales para Ensayo de Semillas", vigente.

Art. 43 Los ensayos en semillas certificadas o en proceso de certificación serán:

a) % de humedad

b) % de semilla pura

c) % de materia inerte

d) % de semilla dura

e) % de germinación

f) N°por Kg. de semillas de otros cultivos

g) N°por Kg. de semillas de malezas secundarias

h) N°por Kg. de semillas de malezas primarias

i) Cualquier otra determinación que el laboratorio considere conveniente.

Art. 44 Las determinaciones a que se refiere el Art. anterior estarán señaladas por las Normas Especificas correspondientes, donde además, se establecerán las tolerancias.

En caso de "Calamidad Pública" el Ministerio de Agricultura y Ganadería, a través de la División, podrá modificarlas provisionalmente.

Art. 45 Para efectos de comprobación posterior, el laboratorio conservará los excedentes de las muestras de semilla analizadas, por un período no mayor de un año, a contar de la fecha del análisis.

CAPITULO X

ENVASES, ETIQUETAS, MARCHAMOS Y MARCAS COMERCIALES

Art. 46 Toda semilla para certificación deberá envasarse en recipientes nuevos, aprovados por la División, los cuales podrán ser de cualquier material y que proteja el contenido contra el efecto de las condiciones de manejo.

Art. 47 Los envase deberán llevar impreso, y en forma destacada lo siguiente:

a) Marca registrada en la División

b) Nombre y dirección del productor

c) Origen: "Producida en El Salvador".

d) Peso neto, en libras

e) Nombre de la especie

f) Número de lote
y cualquier otra información que la División considere conveniente.

Art. 48 Los envases que contengan la semilla tratada con sustancias toxicas, deberán estar marcados en sitio visible con una calavera simbólica y las siguientes leyendas: "Peligro, semilla envenenada, no apta para el consumo humano o animal", "Despues de vaciar el contenido destruyala o quémela".

Art. 49 En las diferentes categorías de semillas bajo el control de la División para los datos exigidos en los Art. 47 y 48, se establecen los colores siguientes:

Semilla de Fundación, Amarillo; Semilla Registrada, Verde; Semilla Comercial Certificada, Azul; Semilla Mejorada, Rojo.

Los emblemas o logotipos que identifican al productor, de color opcional a conveniencia del interesado.

Art. 50 Las etiquetas para semillas certificadas deberán ostentar en forma visible la denominación de la categoría correspondiente, y se distinguirán por su color, así:

Blanca, para Semilla de Fundación
Morada, para Semilla Registrada
Azul, para Semilla Comercial Certificada
Roja, para Semilla Comercial Certificada de inferior calidad
Amarilla, para Semilla Mejorada.

Art. 51 Las etiquetas contendrán los datos siguientes:

a) Nombre y dirección del productor

b) Nombre de la especie y variedad

c) Número de lotr

d) Fechas de cosecha, análisis y vencimiento

e) % de humedad

f) % de germinación

g) % de semilla pura

h) % de materia inerte

i) N°x Kg. de semillas de otras variedades

j) N°x Kg. de semillas de otros cultivos

k) N°x Kg. de semillas de malezas primarias y secundarias

l) Secundarios

Además las etiquetas contendrán cualquier otra información que la División estime conveniente.

Art. 52 Las etiquetas para plantas certificadas contendrán los siguientes datos:

a) Nombre y dirección del productor

b) Nombre del vivero registrado

c) Especie y nombre de la variedad

d) Fecha de certificación

e) Número del lote

Y otras informaciones que la División estime conveniente.

Art. 53 Las etiquetas de certificación tendrán caracter legal cuando lleven impreso el sello de la División.

Art. 54 Los marchamos de seguridad y etiquetas para certificación, serán obligatorios. Cada planta o envase con semillas destinadas a la comercialización, deberá ostentar una etiqueta y su correspondiente marchamo de seguridad.

Los marchamos llevarán la siguiente leyenda: "DIVISION DE CERTIFICACION DE SEMILLAS Y PLANTAS - MAG - EL SALVADOR, C.A."

Art. 55 Los marchamos de seguridad y etiquetas de certificación serán distribuidos unicamente por la División, previa cancelación de los derechos establecidos para su adquisición.

Art. 56 La colocación de marchamos de seguridad y etiquetas será supervisada por inspectores de la División.

CAPITULO XI

COMERCIALIZACION DE SEMILLAS Y PLANTAS CERTIFICADAS

Art. 57 Toda persona natural o jurídica que se dedique a la importación, exportación, y a la venta de semillas y plantas certificadas, deberá estár registrada en la División.

Art. 58 Para exportación e importación de semillas y plantas certificadas el interesado, de acuerdo a la Ley, deberá presentar solicitud ante los organismos correspondientes y estas para resolver consultará a la División de Certificación de Semillas y Plantas.

Art. 59 Se prohibe la comercialización de semillas y plantas certificadas importadas que, al analizarlas se compruebe que su calidad está debajo de las tolerancias que por Ley exigen los Reglamentos de certificación.

Art. 60 Todo productor, importador de semillas y/o plantas certificadas, deberá someter a la aprobación de la División los emblemas, logotipos, leyendas, marcas de comercio y cualquier otro material impreso que utilice para promover las semillas o plantas certificadas.

Art. 61 Los distribuidores que se dediquen a la venta de semillas o plantas certificadas, están obligados a llevar un registro que comprenderá:

a) Especie y variedad

b) Nombre del productor y marca

c) Lugar de producción

d) Fecha de certificación y fecha de compra

e) Número que ostentan los lotes vendidos

Art. 62 El productor o distribuidor está obligado a solicitar a la División el remuestreo, para la comprobación de la calidad de la semilla. Este remuestreo deberá realizarse previo al inicio de la temporada de siembra; y el resultado del análisis será requisito para autorizar su venta. Los gastos de esta operación seran por cuenta de los propietarios.

Art. 63 La destrucción de semillas, envases, etiquetas y marchamos según lo establecido en el literal G del Art. 5 del Capítulo II de este Reglamento, se hará en presencia de un inspector, y como sanción colateral los gastos de esta operación serán por cuenta de los propietarios.

Art. 64 Todo lo considerado en el presente Reglamento será resuelto por la División de Certificación de Semillas y Plantas, basado en consultas y criterios técnicos acordes con las Normas de Certificación de Semillas y Plantas.

APPENDIX 12

PROPOSED NORMAS ESPECIFICAS DE CERTIFICATION PARA PRODUCIR SEMILLA DE SORGO (Sorghum Bicolor)

I - CATEGORIAS Y FUENTES DE SEMILLA

MATERIAL BASICO

1 - El material básico de sorgo lo constituyen los cruzamientos simples, las líneas androestériles (Líneas A), isogénicas y no isogénicas (Líneas B), líneas restauradoras (Líneas R) y la primera generación de variedades.

VARIEDADES DE POLINIZACION LIBRE

2 - Semilla de fundación. Para producír esta categoría se sembrará la semilla genética y no se permitirá más de dos generaciones de incrementación.

3 - Semilla Registrada. Esta categoría provendrá de la semilla de fundación y tablién se limita a dos generaciones su incrementación.

4 - Semilla Comercial Certificada. Para producír esta categoría se sembrará semilla registrada o la semilla de fundación.

Una segunad cosecha de un mismo cultivar, se podrá obtener de los "rebrotes" y conservar la categoría mediante la aprobación del Departamento.

HIBRIDOS BASICOS

5 - Un híbrido básico de sorgo lo constituye la primera generación del cruzamiento controlado entre dos o más líneas básicas, y solamente se admite la categoría certificada.

6 - Semilla de Fundación. Esta categoría está constituida por:
Líneas androestériles (Línea A), líneas mantenedoras (Línea isogénica B), línea no isogénica B, línea restauradora (R) y la cruza simple de la línea A con la línea no isogénica B.

7 - Semilla Comercial Certificada. Para la producción de esta categoría se sembrará la semilla resultante del cruzamiento simple de la línea androstéril (Línea A) y la línea no isogénica (Línea B) contra una línea restauradora (Línea R).

8 - No se podrá utilizar como semilla la que procede de los surcos de la línea mantenedora y restauradora.

II - REQUISITOS DEL TERRENO

9 - El cultivo semillero deberá sembrarse en un terreno que haya sido ocupado anteriormente con un cultivo diferente o con sorgo de la misma categoría

y variedad, o de categoría superior, si se va a producir semilla de una variedad de polinización libre, o de lo contrario, ya sea para producir híbridos o variedades, el terreno debió estar libre de sorgo, otras especies de sorgos silvestres, zacates: Sudán, Johnson, Escobero, o de la combinación de éstos, por lo menos por un año.

10 - No se permitirá la multipicación de sorgos en ninguna de sus categorías en terrenos y zonas donde se haya determinado la presencia de enfermedades peligrosas que perduren en el suelo y que sean transmisibles por semilla, mientras no se realicen medidas preventivas y de control, a satisfacción del Departamento.

11 - El área mínima para la producción de semilla de la categoría comercial certificada será de 25 mz. por campo semillero.

III - AISLAMIENTO

12 - Las tablas I y II determinanlas distancias mínimas tolerables de los campos contaminantes.

Tabla 1. Híbridos (Distancia en metros)

Clase de cultivo	Categorías	Grano	CONTAMINANTES			
			Forrajero (t.Sudán)	Escobero	Johnson	Zacate Sudán
Graníferos	Fundación	1000	2000	5000	500	1000
	Comercial Certificada	500	1000	5000	400	1000
Forajeros	Fundación	1000	2000	5000	600	1000
	Comercial Certificada	300	300	5000	400	400

Tabla 2. Variedades de Polinización libre
(Distancia en metros)

Clase de cultivo	Categorías	Grano	Forrajero	Escobero	Johnson	Sudán
Graníferos	Fundación	300	1000	5000	400	1000
	Registrada	300	1000	5000	400	1000
	Comercial Certificada	100	500	5000	400	500
Forajeros	Fundación	300	300	5000	500	1000
	Registrada	300	300	5000	500	1000
	Comercial Certificada	100	100	5000	300	1000

Distanciemaiento en tiempo.

13 - El campo semillero tendrá que sembrarse con 25 a 30 días después de las siembras contaminantes, con el propósito de evitar la coincidencia en la polinización. Al coincidir en la floración, el máximo traslape permisible será de 1 de plantas en antesis en el campo contaminante cuando exista más del 5% de plantas con estigmas receptivos en el campo semillero. Se computarán como plantas en floración cuando una cuarta parte como mínimo de la panoja esté derramando polen o esté con estigamas receptivos.

IV - PRACTICAS AGRONOMICAS

Incrementación de la Línea Andrestéril (Línea A)

14 - Cuando se tiene el campo de mantenimiento con "A" como hembra, y con B (mantenedora) como macho, se deberán eliminar toda planta que manifieste polen fértil en el surco hembra.

Incrementación de la Línea Isogénica (Mantenedora), Línea B.

15 - Eliminar toda planta andrestéril.

Incrementación de la Línea no Isogénica B.

16 - Eliminar toda planta andrestéril.

Formación de cruzas.

17 - Eliminar las plantas con polen fértil de los surcos hembras.

V - INSPECCIONES

18 - Las inspecciones mínimas de campo serán: al terreno, durante la siembra, previa a la floración, a plena floración, previa a la cosecha y durante la cosecha.

VI - PUREZA GENETICA

Cruzamientos básicos, Líneas y Variedades.

19 - Las plantas fuera de tipo se eliminarán antes de la emición de pólen.

20 - Se rechazará para certificación el campo semillero de un cruzamiento básico o incremento de una línea andrestéril cuando se encuentre que dos (2) plantas fuera de tipo por mil (0.2%) del progenitor masculino estén expulsano o hayan expulsado pólen.

21 - Cuando se usa un progenitor andrestéril, si en éste se encuentran plantas expulsando pólen, es necesario erradicarlas; si se encuentra en una proporción mayor de una (1) planta por cada mil en el campo ésta debe eliminarse.

22 - Un campo de producción será rechazado cuando se encuentre que más del 5% de las plantas del progenitor femenino tiene estigmas receptivos, y más de una (1) por mil (01%) están expulsando polen o ya lo han expulsado.

23 - En el caso de variedades se eliminan campos semilleros con más de dos (2) plantas fuera de tipo por mil (0.2%).

24 - Se rechaza para certificación un cmapo de producción de semilla híbrida cuando se encuentra que más del 5% de plantas del progenitor femenino tienen estigmas receptivos, si en cualquier inspección más del 1% de las plantas del mismo progenitor están expulsando pólen.

VII - COSECHA

25 - En la producción de híbridos, los surcos polinizadores deben de cosecharse antes de comenzar la cosecha de los surcos receptores o hembras.

26 - En el siguiente cuadro se determinan las tolerancias de campo por categorías

Factor	Fundación	Registrada	Comercial
Otras variedades	0	2 pts/mz.	4 pts/mz.
Enfermedades peligrosas	0	0	0
Malezas primarias	0	0	0
Plantas atípicas	2 pts/mz.	4 pts/mz.	5 pts/mz.
Plantas con pólen fértil en surcos hembras androestéril.	2 pts/mz.	2 pts/mz.	5 pts/mz.

VIII - REQUISITOS Y TOLERANCIAS DE LABORATORIO

Factor	Fundación Etiqueta Blanca	Registrada Etiqueta Morada	Comercial Etiqueta Azul	Certificada Etiqueta Roja	Etiqueta Amarilla
Germinación mínimo	80%	80%	80%	70%	80%
Semilla pura mínimo	98%	98%	98%	97%	98%
Materia inerte máximo	2%	2%	2%	3%	2%
Humedad máximo	11%	11%	12%	13%	12%
Semillas:					
Otras varied. máximo	0	0	0	0	,0
Otras cultivos máximo	1/kg.	2/kg.	5/kg.	10/kg.	5/kg.
Malezas primar. máximo	0	0	0	0	0
Malezas secund. máximo	0	2/kg.	10/kg.	10/kg.	10/kg.

APPENDIX 13

PROPOSED NORMAS ESPECIFICAS DE CERTIFICATION PARA PRODUCIR SEMILLA

I - FUENTES DE SEMILLAS

1. Para producír semillas certificadas de Fundación, ésta provendrá de la semilla genética; La Registrada de la semilla de Fundación y la Comercial Certificada de la semilla Registrada y en determinados casos se podrá usar semilla de Fundación con la aprobación del Departamento.

2. El área mínima para porducír semilla Comercial Certificada será de 50 mz. por localidad, y para producír semillas de Fundación y Registrada el área se establecerá de acuerdo a las necesidades de las semillas de las siguientes categorías.

II - REQUISITOS DEL TERENO

3. El lote destinado para la producción deberá haber sido ocupado anteriormente con un cultivo diferente, o con arroz del la misma variedad y de una categoría superior. En caso contratio el lote debió de haber estado libre de arroz por lo menos un año en el caso de que se va a sembrar de "secano", y si no durante tres meses si es por transplante y bajo el sistema de "fangueo", y la semilla a usar tendrá que ser de la certificada.

III - SIEMBRA

4. Se establecen los sistemas de siembra para las siguientes categorías:

   a) De Fundación:

      Debe incrementarse únicamente por trasplante, y poniendo una sola planta por postura, utilizando la práctica de fangueo. Y no se permitirá más de dos generaciones la incrementación de esta categoría.

   b) Registrada y Comercial Certificada:

      La multiplicación puede efectuarse por trasplante o por siembra directa en surcos.

   c) Se permitirá la reposición de plantas o replante en la siembra por trasplante a más tardar seis días después de la postura inicial.

IV - AISLAMIENTO

5. Para cada lote de multiplicación, la distancia mínima de aislamiento será de 10 metros para la misma variedad y de la misma categoría, y para los

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lotes que el contaminante sea de una variedad y categoría diferente será de 50 metros.

6. Cuando la siembra de los lotes vecinos, con una variedad diferente se efectúa con avión, y paralelo al sentido de siembra del campo semillero la separación será de 100 metros.

   De cuatrocientos (400) metros cuando se hace con dirección de vuelo perpendicular o en la misma dirección del sentido de siembra del lote semillero.

V - INSPECCIONES

7. El mínimo de inspecciones de campo serán: al terreno, durante la siembra, previa a las floración, durante la floración, previa a la cosecha y durante la cosecha.

VI - TOLERANCIAS DE CAMPO

8. El cuadro siguiente determina las tolerancias de campo

Factor	CATEGORIAS Fundación	Registrada	Comercial Certificada
Otras variedades	0	2 plts/mz.	6 plts/mz.
Enfermedades peligrosas transmisibles por semilla, o que afecten la calidad de la misma.	0	0	0
Malezas primerias	0	0	0
Arroz rojo	0	0	2 plts/mz.
Arroz negro	0	0	2 plts/mz.
Malezas secundarias	Que no compitan significativamente		

VII - COSECHA

9. El Productor está obligado a tomar toda clase de precauciones indicadas por el Inspector, antes y durante la cosecha.

VIII - REQUISITOS Y TOLERANCIAS DE LABORATORIO

10. Las condiciones finales que debe reunir la semilla de arroz para su certificación se determinan en el cuadro siguiente:

CATEGORIAS

Factor	Fundación Etiqueta Blanca	Registrada Etiqueta Morada	Comercial Etiqueta Azul	Certificada Etiqueta Roja	Nejorada Etiqueta Amarilla
Germinación mínimo	70%	80%	80%	70%	80%
Semilla pura mínimo	98%	98%	98%	97%	98%
Materia inerte máximo	2%	2%	2%	3%	2%
Contenido humedad máximo	12%	12%	12%	13%	12%
Semilla otras variedades máximo	0	0	0	0	0
Semilla otros cultivos máximo	0	1/kg.	3/kg.	5/kg.	5/kg.
Semilla Malezas primarias máximo	0	0	0	0	0
Semilla Malezas secundarias máximo	0	0	4/kg.	4/kg.	4/kg.

NORMAS A SEGUIR PARA PRODUCCION DE SEMILLA DE ARROZ (ORYZA SATIVA)

FUENTE DE SEMILLA:

Dentro de la producción de semilla de Arroz se encuentran las siguientes categorias:

1 - Semilla de fundación	a) Genética b) Básica
2 - Semilla comercial	a) Registrada b) Certificada c) Mejorada

A - Semilla Genética:

Es el material obtenido por el mejorador de plantas y semillas; por el método de:

a) Introducción
b) Selección
c) Cruzamiento

Considerandose como uso exclusivo del Banco de Germoplasma del país, por ser este material de fundación que dá origen a nuevas variedades.

B - Semilla Básica:

Es el material obtenido de la Incrementación de la semilla genéâtica y es propiedad del Estado, su Multiplicación y -- Procesado debe de ser sometida a la supervisión del Departamento de Certificaión de Semilla y Plantas, como cualquier productor cumpliendo con todos los requisitos exigidos.

C - Semilla Registrada:

Es el material obtenido de la multiplicación de la semilla básica y es el Estado el encargado de la Producción; bajo la supervisión del Departamento de Certificación de Semillas y Plantas como cualquier producto cumpliendo con todos los requisitos exigidos.

D - Semilla Certificada:

Es el material obtenido de la multiplicación de la semilla Registrada y es el Estado y los Productores de Semillas inscritos en el Departamento de Certificación de Semillas y -- plantas, Dependencia del Ministerio de Agricultura y Ganadería, los encargados de producir la semilla bajo las normas reglamentadas por el Departamento de Certificación de Semilla y Plantas.

E - Semilla Mejorada:

Es el material producido por cualquier productor y que no cumple con los requisitos exigidos para Certificarse pero si se sobe que es de buena procedencia.

El área de la expotación en producción de semilla variará de acuerdo al sistema de cultivo y a la demanda de mercado y con los Programas de Gobierno en materia de Producción siendo el área mínimo de 10 Ha. toda vez que la producción a obtener sean rentables al productor y se cumplan las normas dadas por el Organismo Oficial.

La zona o área seleccionada tiene que ser especialzada siguiendo requisitos:

- Suelo, clima y conocimiento agronómicos tienen que ser idóneos.
- Disponibilidad en el lugar de: Equipo, Insumo y Mano de -- obra.
- Vías de comunicación accesibles en todo tiempo a la propiedad y a al cultivo.

Requisitos en la siembra:

El lote destinado para la siembra de Arros de Semilla, de preferencia no tiene que habor tenido siembras de Arroz durante un año antes.

De haberlo tenido tiene que seguirsele 3 pruebas de germinación de mínimo, probocándo la germinación con riego y paso de rastra cada 15 días ó de preferencia rotar el cultivo con un cultivo de covertura.

Ejemplo una leguninosa y despues de la floración del cultivo incorporar y en seguda preparar el suelo para la nueva siembra.

Siembra

Pueda efectuarse por cualquier método, toda vez que se conserve una buena reparación entre planta y planta. Para mantener la pureza genética varietal.

Aislamiento

La distancia o separación depende del método de siembra y esta separación tiene que ser por: Caminos, Canales de riego, Canales de Drenaje, Cercas u otros límites bién definidos.

Limpieza y libres de malezas. Asegurándose que no exista el peligro de contaminación causado por agua que llegue al cultivo procedente de otro campo de producción.

Semillero para Trasplante

Los emilleros tienen que hacerse en suelos que no hayan tenido Arroz durante los últimos 6 meses y tienen que estar libres de rastrojo y plantas (de Arroz) 6 metros al contorno.

Siembra por trasplante. La distancia mínimo de separación debe de ser de tres metros entro campo y campo.

Siembra con sembradora. La distancia varía entre 4 a 10 metros.

Siembra al voleo con Equipo Terrestre. La distancia mímimo de campo a campo debe de ser por lo menos de 15 a 20 metros, dependiendo de la velocidad rotativa de la sembradora.

Inspecciones

El campo debe de ser inspeccionado por el Inspector (con la presencia del productor de semillas o responsable directo del cultivo), durante:

1) La siembra.
2) Durante la étapa de crecimiento.
3) Unos pocos días antes y unos pocos días después de la salida de las Espigas.
4) Durante la cosecho.

2 y 3 fechas cuando las mezelas varientales son más fáciles de identificar.

4 evitar mezclas mecanicas y mezclas por rechazo de Lotes.