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# Acceptability Index Characterization and Process for Corn Cultivars in El Salvador, Central America

# By Dora Ma. Sangerman-Jarquín , José Arístides Deleón, Rita Schwentesius De Rindermann, Agustín Navarro Bravo & Bertha Sofía Larqué Saavedra

Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), Mexico

*Abstract*- The objective of this 2007 study was to characterize the process of the acceptability index of the Oro Blanco, Platino, and Protemás corn cultivars, and also to identify social, economic, agricultural, and technological variables that could explain the causes of acceptance or rejection of technology, by producers who were beneficiaries of the 2006- 2007 Program for Improvement of Basic Grain and Grass Production. This acceptability study identifies strengths and weaknesses of such technology for the stages of the transfer process. The study was conducted in 2008, in Regions I and IV of El Salvador; a survey was taken, with 133 corn producers who were beneficiaries of the 2006-2007 program for promotionof basic grain and grass production. One of the most important findings was that approximately 60% of the producers were willing to cultivate the study materials during the following agricultural cycle. These project beneficiaries were willing to sow the cultivars, called QPM, Quality Protein Maize, or in Spanish ACP for "Alta Calidad de Proteína" in 96% of areas sown with QPM, in year 2007. The Oro Blanco cv had the greatest acceptability, with an acceptability index of 82.5; Protemás scored 69.6, and Platino obtained 53.7%.

Keywords: corn, protein quality, cultivars, platino, oro blanco, and protemás.

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# Acceptability Index Characterization and Process for Corn Cultivars in El Salvador, Central America

Dora Ma. Sangerman-Jarquín <sup>α</sup>, José Arístides Deleón<sup>σ</sup>, Rita Schwentesius De Rindermann<sup>ρ</sup>, Agustín Navarro Bravo <sup>ω</sup> & Bertha Sofía Larqué Saavedra<sup>¥</sup>

Abstract- The objective of this 2007 study was to characterize the process of the acceptability index of the Oro Blanco, Platino, and Protemás corn cultivars, and also to identify social, economic, agricultural, and technological variables that could explain the causes of acceptance or rejection of technology, by producers who were beneficiaries of the 2006-2007 Program for Improvement of Basic Grain and Grass Production. This acceptability study identifies strengths and weaknesses of such technology for the stages of the transfer process. The study was conducted in 2008, in Regions I and IV of El Salvador; a survey was taken, with 133 corn producers who were beneficiaries of the 2006-2007 program for promotionof basic grain and grass production. One of the most important findings was that approximately 60% of the producers were willing to cultivate the study materials during the following agricultural cycle. These project beneficiaries were willing to sow the cultivars, called QPM, Quality Protein Maize, or in Spanish ACP for "Alta Calidad de Proteína" in 96% of areas sown with QPM, in year 2007. The Oro Blanco cv had the greatest acceptability, with an acceptability index of 82.5; Protemás scored 69.6, and Platino obtained 53.7%.

Keywords: corn, protein quality, cultivars, platino, oro blanco, and protemás.

# I. INTRODUCTION

he study was conducted by means of a survey, in 2007. Quality Protein Maize Cultivars, QPM in English or ACP in Spanish were sown in Regions I and IV of El Salvador. The study was done with the participation of the beneficiaries of the Program for Improvement of Basic Grain and Grass Production, 2006-2007, supported by Ministry of Agriculture and Livestock (MAG, *Ministerio de Agricultura y Ganadería*) of El Salvador, through National Center for Agricultural and Forest Technology (CENTA, *Centro Nacional de Tecnología Agropecuaria y Forestal*).

## II. MATERIALS AND METHODS

#### a) Study area

The areas selected were in the western and eastern regions of El Salvador, identified as Regions I and IV, because they have the greatest amount of malnutrition problems. Region I includes the departments of Santa Ana, Sonsonate, and Ahuachapán, where 62803 ha are cultivated, on 26% of national soil, where an average yield of 2140 kg ha<sup>-1</sup>was reached (MAG-DGEA, 2007). It is important to mention that for the calculations regarding the hybrid corn Oro Blanco, the municipalities of La Nueva Concepción and La Palma from the department of Chalatenango were included, and that, although they politically and administratively correspond to Region II, within the institutional structure of CENTA they are considered Region I (Figure 1).



*Figure 1 :* Location of beneficiaries per municipality in the 2006-2007 Program for the Promotion of Basic Grain and Grass Production.

Region IV includes the departments of La Unión, San Miguel, Morazán, and Usulután, where 85 837 ha of corn are cultivated (MAG-DGEA, 2007), on 35.6% of the national cultivation surface area. In that region, 33.2% of national grain production is harvested and an average yield of 2010 kg ha-1 is obtained. The total number of producers that sowed QPM corn for the first time in 2007, with one or more of the following cultivars: Platino (281), Oro Blanco (60) and Protemás (200), was 541 growers (Figure 1).

Author α O ¥: Campo Experimental Valle de México, Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias. Los Reyes-Texcoco, Coatlinchán, Texcoco, Estado de México.

e-mails: larque.bertha@inifap.gob.mx, navarro468@yahoo.com.mx, sangerman.dora@inifap.gob.mx

Author o: Unidad de Socioeconomía del Centro Nacional de Tecnología Agropecuaria y Forestal del Ministerio de Agricultura y Ganadería de El Salvador, C.A. (CENTA-MAG). e-mail: leonsalvadoreno@hotmail.com

Author p: CIIDRI- Universidad Autónoma Chapingo. Carretera México-Texcoco, km 38.5 Chapingo, Texcoco, Estado de México. e-mail: rschwent@prodigy.net.mx

#### b) Sample

From a total of 541 beneficiaries that in 2007 had contact with the technology in one of the 15 extension agencies located in the western and eastern regions, 133 (almost 25%), were selected at random, from which 36 producers sowed Oro Blanco, 73 Platino, and 25 Protemás, respectively. The seeds that they used were supplied by the "2006-2007 Program for the Promotion of Basic Grain and Grass Production," sponsored by CENTA-MAG.

#### c) Data evaluated

This work was performed in the field, beginning with information gathering, through a survey with a target population in the study area, for which a survey team was hired, with their respective supervisors, in both regions.

The next step was the data verification phase, a second visit or a "revisit" to a producer, conducted by field supervisors at random.

### d) Available information

- MAG-CENTA Program records regarding seed allotment to the producers that received the corn cultivars evaluated in the study area.
- Information gathered from "Record of Materials and Hybrid Quality Protein Maize," modified for local conditions in the study area.
- Database from the 2007 Population and Housing Census taken in El Salvador: a tool for census exploitation and online interactive maps.
- PASOLAC (PASOLAC, IICA) The Acceptability Index (AI) Methodology used to estimate the cultivation acceptability index, modified for local conditions in this study.
- e) Characteristics of the cultivars evaluated in the study
- Oro Blanco. A white grain hybrid quality protein maize(HI = 92% (CENTA-MAG, 2008)), with a potential yield of 7143 kg ha-1 and an average yield of 4870 kg ha-1. It has good size and ear structure, with excellent coverage; a crystalline grain texture, and is tolerant to weevil damage and relatively tolerant to erratic precipitation and conditions.
- Platino. A white grain hybrid quality protein maize (HI= 90%). Has a potential yield of 6494 kg ha-1
- g) General acceptability index formula

and average yield of 4 545 kg ha-1. It has good size and ear structure, and excellent coverage; a crystalline grain texture, and is tolerant to weevil damage and relatively tolerant to erratic precipitation and conditions.

• Protemás. A corn variety, a free-pollination cultivar of white semi crystalline grain, a quality protein maize (HI = 90%); potential yield of 5844 kg ha-1 and average yield of 3701 kg ha-1. Good size and ear structure and excellent coverage. Good root system that provides strong support.

# f) Acceptability Index (AI)

The acceptability index is a simple tool designed for monitoring technology transfer activities, developed by the PASOLAC Project in 1999.

The Acceptability Index is part of a group of socioeconomic tools that are used in the introductory and participatory processes of diffusion of agricultural technologies, and in the monitoring of these technologies. This process begins with technology validation, then a transfer period, and finally allows researchers to determine whether or not the study technology provides the specific production, consumption, and commercialization conditions that will satisfy the needs of the producers that use them.

This acceptability study was conducted in order to identify strengths and to adjust the weaknesses of a technology that is in the transfer process stage. It was expected with this first important QPM technology transfer effort run by the government, that producers should have the opportunity to implement a recently understood practice and that an initial idea of acceptance or rejection might be gained, which is the objective of this tool.

This study evaluated the extent to which QPM corn, specifically the Platino, Oro Blanco, and Protemás cultivars, were accepted by the beneficiaries of CENTA's program, so that their decision to accept or to reject technology might be based on results obtained in a previous crop with these materials. The Al of a variety is mathematically calculated using base years for calculation and comparison, and percentages of total producers and areas sown with QPM corn, as shown in the following general formula:

# Al (Acceptability Index) = $\frac{(\% \text{ of producers applying the technology }) \times (\% \text{ of area involved })}{100}$

h) Adapted formula for calculation of the acceptability index

This study used an adapted formula that we will call the acceptability index, adapted from PASOLAC 1999. This formula was used to compare data regarding

producers that used QPM technology in 2007, with producers that expressed their desire to apply the technology in 2008, if they were given the seed or if it were available in the market.

Acceptability Index = 
$$\frac{\left[\frac{\left[QPMProducers 2008}{QPMProducers 2007}\right] \times 100\right] \times \left[\left[\frac{QPMArea 2008}{QPMArea 2007}\right] \times 100\right]}{100}$$

- QPM Prod. 08= number of producers sampled that would apply QPM technology in 2008 if there were seed available on the market.
- QPM Prod. 07= number of producers that applied the technology in 2007.
- QPM Area 08= area where the technology would be applied as per the producer's free will, if there were seed in the market in 2008.
- QPM Area 07= total area sown with QPM corn in 2007.

# III. Results

a) Re-structuring of corn production, 1996-2008

From 1996 to 2008, the government of El Salvador made important efforts to restructure national

corn production. One of these efforts was the promotion of the use of hybrid and improved cultivars, in which success has been achieved of up to 77% as regards the adoption of these materials by producers (MAG-DGEA, 2007) at the national level.

The practice has increased cultivation yields in the last decade, from an average of 2169 kg ha<sup>-1</sup> in 1996, to 3078 kg ha-1in 2006 (MAG-DGEA, 2007).

The following figure shows surface area, production, and yield for the 1996-2007 period, and uses the year 2000 as a baseline, as 100%, for the calculation of the indices (MAG-DGEA, 2007) (Figure 2).



*Figure 2 :* Surface, production, and yield indices in corn cultivation 1996-2007, in El Salvador, C.A. (year 2000 = 100).

Surface areas used for corn cultivation decreased by 18.2%, which reduced the production of approximately 4,000 producers per year. However, in spite of this decrease in area, there was an increase in production in same period, by 41.9% kg ha<sup>-1</sup>, which represented an increase in national production by 16% of total produced volume. Thus, between 2006 and 2007, CENTA's technology transfer process gained new ground with respect to the solution, through the implementation of the "2006-2007 Program for the Promotion of Basic Grain and Grass Production" (CENTA-PAO, 2006-2007).

Production of these three corn cultivars requires more arable land per ingested calorie, and production per hectare of legumes is usually less than that of cereals (CIMMYT- PURDUE, 1977): challenges in the process of diffusion of the technology. In this context, 336163 Mz [234911 ha] of corn are cultivated in the country on average; with contribution of the seeds distributed by the project, an added cultivation of 40488Mz [28 293 ha] has been achieved, 12% of the cultivated area at a national level (CENTA, 2008).

### b) Nutritional Characterization of Evaluated Cultivars

For some time, national and international institutions have agreed that the child population of El Salvador has some type of malnutrition, reaching levels up to 57% in rural areas (CENTA-MAG, 2007). The diet consumed by most of the population of El Salvador consists mainly of corn and beans.

These diets currently consumed are not efficient in providing high quality proteins.

Studies have shown that the nutritional value of one's diet improves when it is supplemented with lysine and tryptophan, which are found in the QPM corns Oro Blanco, Platino, and Protemás (CENTA AGRO INNOVACIÓN 2007). These non-transgenic varieties are considered Quality Protein Maize by the International Maize and Wheat Improvement Center (CIMMYT, *Centro Internacional de Mejoramiento de Maíz y Trigo*). This type of corn represents a significant improvement in nutritional level for human and animal consumption over common corn and hybrid materials, which have been used in El Salvador for the past ten years.

The social groups that are able to benefit from implementation of QPM corn cultivation are: (1) the poor rural class which consumes most of the production; (2) the urban poor class; (3) the producer class that produces grain and food for livestock; (4) the commercial grain producers; and (5) the mainstream consumer group.

c) Calculation of 2008acceptability index for QPM material

The original concept of the acceptability index for monitoring the early diffusion of agricultural technologies was established some years ago by Hildebrand and Poey, in 1999. They reported that a technology can have success in acceptance when the percentage of growers that accept it is at least 50%, and at the same time, the numerical index value should be at least 25 units.

Acceptability Index calculated based on2008 survey data, as shown in Table 1.

Table 1 : Acceptability	Index of QPN	I material in Regions	I and IV in El Salvador,	Central America.
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Geographic Area	Variety	No. QPM Prod. 07	No. QPM Prod. 08	(%) Prod. 08/07	QPM Area 07	QPM Area 08	(%) Area 08/07	AI 2008
National	QPM	133	80	60.15	75	71	94.67	56.94
National	Oro Blanco	36	24	66.67	21	26	123.81	82.54
National	Protemás	24	13	54.17	7	9	128.57	69.64
National	Platino	73	49	67.12	45	36	80.00	53.70
Region I	QPM	75	46	61.33	47	44	93.62	57.42
Region I	Oro Blanco	20	9	45.00	13	17	130.77	58.85
Region I	Protemás	0	0	0.00	0	0	0.00	0.00
Region I	Platino	55	37	67.27	32	27	84.38	56.76
Region IV	QPM	58	37	63.79	28	27	96.43	61.51
Region IV	Oro Blanco	16	12	75.00	8	10	125.00	93.75
Region IV	Protemás	24	13	54.17	7	9	128.57	69.64
Region IV	Platino	18	12	66.67	13	9	69.23	46.15

Source: own field work.

Table 1 shows that 60.1% of the surveyed producers, beneficiaries of the project for allotment of QPM corn seed in 2007(80 of a total 133), were willing to cultivate 94.6% of their surface area (71 out of 75 ha), and that they would be willing to sow during the next agricultural cycle.

It is observed, according to the results of the 2008 acceptability index regarding the producers benefitting from the 2007 allotment of QPM corn seed, that of the study material, the hybrid corn Oro Blanco was the most highly-rated cultivar, with a general acceptability index in both regions, of 82.5; in second place, Protemás obtained AI= 69.6 and Platino, in third place, scored AI= 53.7. Oro Blanco is an exceptional case, 82.5%; 23% of the total producers were willing to sow an extra area of the total surfaces during the study; that is to say that the index of acceptability of the technology, subject to available seed in the market, exceeded the areas that will be dedicated thereto in the next agricultural cycle, for the areas in which the survey was taken.

Similarly, with Protemás; 67.1%, 28.5% of the producers benefitting from the 2007 allotment of QPM

corn seed were willing to sow an area that was greater than 100% of the area sown.

With respect to the acceptance level of the study material from a geographical point of view, at the regional level, it was found that the producers' willingness with regard to new technology in Region I was AI = 57.4, while in Region IV it was AI = 61.5, although with the data gathered, it was not possible to determine the cause of difference in the index between both regions. When comparing the acceptability indices between evaluated materials and their geographical location, it can be observed that Oro Blanco in Region I has a much lower acceptability (AI= 58.8) than in Region IV (AI = 93.7); Platino had an opposite behavior, being more accepted in Region I (AI= 56.7) than in Region IV (AI = 46.1). Protemás was not cultivated in Region I, while it had an AI= 69.6 in Region IV. This shows that distribution of QPM material can be adapted based on acceptability index, to the geographical environment.

#### d) Nutritional Quality of QPM Material

The nutritional quality of QPM corn, measured based on protein percentages and tryptophan contents,

was determined in a laboratory in the study conducted by (Déras, 2008) (CENTA-MAG, 2007). The findings of this investigation were consistent with the results obtained in similar studies, carried out at the University of Purdue, where it was also established by laboratory analysis that QPM corns contain at least twice the amount of the essential amino acid tryptophan and it was also determined that they have a quality index greater than 0.80 (CENTA-MAG, 2007).

Table 2 shows that, of the cultivars studied, QPM corns have a quality index higher than or similar to 0.90, which puts them far above some traditional hybrids used by corn producers, such as H-59 with a value in the table of 0.40.

Table 2 : Analysis o	f grain and seed	d quality of QPN	1 hybrids and	common hybrid corn
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Hybrids	Nitrogen	Protein	Triptophan	Quality Index
H-59 (grain)	1.64	10.23	0.04	0.40
Oro Blanco (grain)	1.72	10.78	0.103	0.96
Oro Blanco (seed)	1.82	11.38	0.104	0.91
Platino (grain)	1.53	9.50	0.092	0.96
Platino (seed)	2.01	12.54	0.113	0.90

Source: own field work.

Another consistent conclusion was drawn from preliminary study results on consumption of corn carried out in the country, with children under two years of age, in the El Havillal neighborhood, in the municipality of Conchagua, La Unión, El Salvador. The study concluded that consumption of the QPM material was correlated with a better probability of weight increase than with consumption of traditional hybrid corn (CENTA-MAG, 2007). This confirms that when including QPM corns in some type of human or animal diet, the proteins that previously were only obtained by a good combination of cereals and legumes or animal proteins are provided to the consumer (CIMMYT PURDUE, 1977).

### e) Current use of corn areas

In the last decade, national corn cultivation policy has changed in response to global commercial policies of regional and international integration. Producers have developed a capacity for response that has allowed them to constantly innovate technologies used for production, with government support guiding the use of improved and hybrid corns.

According to survey results, those corn producers in El Salvador are classified as small farmers,

based on the surface area used for cultivation, since 40% of cultivation areas sown in the study area were smaller than one hectare. 48% was cultivated in parcels of up to 2.4 hectares and the remaining 12% in areas of between 2.3 and 5 hectares of cultivation. With respect to the owners of land in general used for corn cultivation, according to survey, the use of their land has increasingly involved own lands and higher-quality land; the smallest production was done on leased lands and lands of lesser quality. Thus, 65% of the total area sown with corn (187 ha), in the conduct of the study; was done on own properties, while 29% (84 ha) was cultivated on leased lands, and the remaining lands were borrowed lands or involved another similar type of use.

In general, the use of economic resources (surface area, especially) is perceived to be prioritized for corn cultivation, with the purpose of increasing productivity. To the extent that this new way of production is developed, producers will increase the corn quantities they market for consumption as shown in Table 3.

Table 3 : Yields between QPM and hybrid corns.

Comparison of yields of QPM cultivars, and of other hybrids					95% confidence interval for the difference	
	t	Degrees of freedom	SIG (two- tailed)	Difference of means kg ha <sup>-1</sup>	Lowest kg ha <sup>-1</sup>	Highest kg ha <sup>-1</sup>
Yields of QPM cultivars 2007	26.0	131	0.00	2375	2195	2555
Yields of other hybrids	18.1	132	0.00	2939	2620	3259

Test value = 0. Source: own field work.

When stratifying producers, based on production sensitivity analysis, 2 types were identified: commercial producers, because all their production is for sale, and subsistence producers, who produce for self-consumption and a small portion for sale. A significant difference was found between yields of hybrid and QPM corn, of 564 kg ha<sup>-1</sup> on average, 425 kg ha-1 in the lower limit and 704 kg ha<sup>-1</sup>at the higher limit, for both subsistence and commercial producers. Translated into revenues, this equals U.S. \$149 per hectare, which reflects a reduced cultivation profitability on average; the lower limit was U.S. \$112 and the higher limit was U.S. \$185. For this reason, producers perceive that hybrid cultivars are more profitable and more competitive.

With regard to net profit when comparing QPM corn with traditional hybrid corn, the growing of corn at

the national level produces an average income of U.S. \$700 per ha with an investment cost of U.S. \$516 ha, which results in a net profit of U.S. \$184 ha<sup>-1</sup> (Table 4).

Economic situat the producers	ion of	Average income \$ ha <sup>-1</sup> of corn	Average costs \$ ha <sup>-1</sup> of corn	Average profit \$ ha <sup>-1</sup> of corn	Net average profit \$ ha <sup>-1</sup> of QPM cultivars	Net average profit \$ ha <sup>-1</sup> of other hybrids
Ν	Overall	132	133	132	132	133
Average		700.6	516	184.0	-69.9	80.9
Percentiles	25	421.6	403.6	-40.9	-301.1	-166.0
	50	724.4	603.3	196.5	-108.2	168.2
	75	946.2	641.2	411.3	168.8	442.3

Table 4 : Comparison of profitability between hybrid and ACP corns, 2007.

Source: own field work.

When comparing average net profits from hybrid corns against QPM material, using 2007 data, it can be seen that the hybrids obtained US\$80 ha<sup>-1</sup> while QPM corn showed a deficit of approximately U.S. \$69 ha.

As for the statistical distribution of data, the 25thpercentile, as well as the hybrid cultivars (U.S. \$-166 ha<sup>-1</sup>) and QPM (U.S. \$-310 ha<sup>-1</sup>) show a negative result, although the economic loss for the traditional hybrid is smaller. The situation with the 50<sup>th</sup> percentile is similar for both that obtain a positive result, but always in favor of hybrid corn (U.S. \$168 ha<sup>-1</sup>). Finally, at the 75th percentile the profitability of both is positive, but the hybrid corn is always much higher (U.S. \$442.3 ha<sup>-1</sup>). Thus, the difference in income per sale of hybrid materials for an average family is increased to 3,356 kg compared with the 1295 kg produced with QPM corns.

# IV. DISCUSSION

#### a) New acceptability index paradigm

The paradigm changes in current corn production in El Salvador are closely related to the transformation of subsistence production into business agriculture, to market, as well as the introduction of new technology and cultivars. The producer acquires economic motivation by incorporating new technologies to its cultivation system, with a prospect of good yields, grain quality, and greater production profitability. Institutions have promoted a new system for producer decision-making with regard to innovations in their production systems. This system should be based on the social environment of the producer, where food security for his family, the desire for economic improvement, and the technological factor, are key factors at this time in the decision to adopt new cultivars.

### b) Family size

With relationship to this variable, a tendency to consolidate in small groups has been observed in

recent decades with regard to the sizes of families in the rural areas of El Salvador. According to survey results, in the eastern and western regions of the country, the average size of a family unit is five members. However, women of childbearing age (between 15 and 49 years of age) and children younger than 3 years of age constitute approximately 40% of the family unit and of the rural population in general. An average rural family in El Salvador consumes in tortillas and other daily uses of corn a total of 2.5 kg at an average price of U.S. \$0.22 (2008), with a daily investment of US\$0.54, and a total of 958.2 kg annually with a value of U.S. \$210.

The importance of corn consumption in the Salvadoran population's basic diet is obvious, whether as tortillas or some other derivative of the grain. Thus, if families have low income and a diet almost exclusively based on beans and corn with low nutritional content, this population becomes a vulnerable population as regard sits physical and social development. It can be inferred, then, that it would be advantageous for farmers to replace the hybrid cultivars that they currently use with QPM corn. Based on the size of the family unit, this is statistically acceptable since if the family is large and has the alternative of offering a high quality corn, it is logical to bet on this alternative, to offer an higher level of food security.

### c) Interaction of the model in the acceptability index

The acceptability index is presented in the study, as part of systemic model in which exogenous and endogenous structures interact and determine the interdependence of subsystems; they explain the acceptance or rejection of the technology. It is formed from a real concept of producers and explains the behavior of acceptability index levels in El Salvador. Exogenous factors, products of the transformation of the current global economic situation, demand the integration and re-adaptation of the national agricultural economy. Profound technological changes linked to historical factors are necessary in order to maintain the

competitiveness of the family corn production units in El Salvador.

The generation of technologies, technical support, and policies that promote productivity heretofore proposed constitute the way in which producers can learn about the benefits of new QPM material and become willing to replace traditional technologies with new ones. In the agricultural subsystem, in spite of the importance of QPM material due toits nutritional quality and its suitability for domestic consumption, among producers there is the perception that the hybrid corns they already use are preferable because they generate greater income per sale. This study concludes that in El Salvador, nearly 77% of national producers use certified seed, and 60% of this group is interested in cultivating QPM corn.

In synthesis, the new paradigm has led to a change in the profile of a farmer, in which currently they are characterized as land owners with greater experience in cultivation. The culture of hybrid materials has been established, using greater areas and better quality soils, as well as acultivation centered around commercial sales. To evaluate the acceptability index of new seed technologies that are introduced in the Salvadorian agriculture such as QPM corn, it is necessary to adopt a transitional approach with regard to the current processes implemented by the Salvadorian producers.

# V. CONCLUSIONS

The acceptability index of QPM material in Region I and IV of El Salvador reflects that these materials are accepted by approximately 60% of the corn producer population, which is willing to sow in future cycles nearly 33% of the total areas cultivated in 2007, the year in which the study was conducted. The reason why only 60% of producers accepted this technology is due to the fact that QPM corn obtained a yield that was 564 kg ha<sup>-1</sup>lower than that of the hybrid corn, the average yield for which was 2939 kg ha<sup>-1</sup>, equivalent to U.S. \$149 per hectare, affecting cultivation profitability. However, among the producers that accept QPM, 43.5% consider that they are affected by yields, and 45.4% perceive that the protein quality is superior, both for human and animal consumption.

Of the QPM cultivars included in the study, the hybrid Oro Blanco is the most-favored with a general acceptability index of 82.54; Protemás, in second place, obtained an index of 69.64, while the acceptability index of the hybrid corn Platino was 53.70. In Region IV Oro Blanco was the most accepted hybrid, while in Region I the most accepted hybrid was Platino.

When establishing social, economic, agricultural, and technological factors as causes influencing the determination of the acceptability index, each level plays its specific role. Some factors such as

the economic factor strongly determine decision-making by producers, with regard to the use of these materials, in future agricultural cycles.

The technology supported by MAG-CENTA, in technology generation and transfer, is showing a good level of acceptance by producers, in spite of current limitations, such as these QPM materials' need for greater promotion and field testing by means of demonstration parcels, which aim to verify through field work the advantages of QPM corn over hybrid material.

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