

PN ACF 092

101502

**“ FARMING SYSTEMS
ANALYSIS OF SOIL CONSERVATION
OPPORTUNITIES IN SOUTHERN
AHUACHAPAN SMALL FARMS”**

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FEB. 1996**

**Proyecto Protección del Medio Ambiente
Consorcio de Asistencia Técnica,
USAID Convenio # 519-0385**

1 Introduction

The demonstration area is located in the Department of Ahuachapan which is in the western part of El Salvador. The demonstration area covers approximately 470 km². Two thirds of the area is in the municipality of San Francisco Menendez and one third in the municipality of Jujutla. The area has approximately 49,944 habitants. If the average household is considered six individuals then there are 8,322 households - 9,987 households if the average is considered five individuals (Lehrhaupt, et al ,1995)

The agricultural productive areas are divided into three zones. Growers in the coastal/lower watershed zone (both sides of *Litoral* highway) concentrate on traditional (sugar cane), non-traditional (bananas and watermelons) export crops and cattle. There is interspersed rice (lower part), maize/sorghum, sesame, some peanuts (El Zapote) and vegetables. This zone has the least sloping land thus soil erosion is easier to control. Growers in these areas are mainly cooperative members or larger landholders.

The upper watershed zone is characterized by steep slopes, deforestation and soil erosion. The main crops grown are maize/sorghum and maize/sesame with some maize/beans and vegetables for local consumption. Producers are mainly smallholders (less than three manzanas) or cooperative members. Cattle over grazing is a serious problem in the area.

Zone three (near El Imposible National Park) is similar to the upper watershed zone except there are more forested areas. Native trees are still visible in small blocks and interspersed with crops. The main crops are maize/sorghum and maize/beans. Producers are mainly smallholders.

2 Extension System Used in the Project Area

The project area is supported by three CENTA (Centro Nacional de Tecnologia Agropecuaria y Forestal) extension offices. Each office covers not only the project area, but areas which border the project. The offices are located in Cara Sucia (4 agents in DA), El Peñon (4 agents in DA) and Guaymango (2 agents in DA). Some of these agents are financed by the project and some by CENTA.

CENTA has employed the "Extension Dirigida a Objetivos" system developed by the World Bank. El Salvador has a loan to improve their extension system and the World Bank is providing the funding.

The planning for extension activities is based on a fifteen-day schedule. Each day the agent has a route to follow. These routes are made up of 3 to 4 groups of farmers (each group has 8 or more farmers) who are headed by a contact farmer. The farmers meet at a prearranged location and the extension delivers a talk on a specific subject. These subjects are planned at the beginning of each year and they are supposed to coincide with the agricultural calendar.

The agents carry out demonstration and validation plots on the different routes. Many of the plots are with the contact farmers. CENTA provides most of the inputs for these trials and the farmers provide labor. During the production season the agent and farmer follow the crops' progress and at least the farmer group from that area visits the trial. At harvest the field is sampled to determine yield or other characteristics which are being followed.

The agents also collect yield data as part of a national program to establish a data base. They are sampling maize, sorghum and bean fields of their contact farmers. Up until last year, agents did not have a set number of plots in each field to harvest. There were some agents who were taking 10 samples per manzana and others who were taking one. This year it has been standardized on 4 plots. There still is not a standard size plot. Different agents still are harvesting different size plots. Agents complained that the data they collected did not agree with the producers yield estimates. Farmer's field sizes and yields are estimated. It is difficult to obtain the same yield from a sample as the grower would obtain from the whole field. However, the estimates should be similar which is not the case at present. You cannot estimate sack weights or area and expect to have yields similar as a sample which is an exact size and weight. Recommendation: Agents should standardize the plot size, plot number and have access to a measuring wheel and scales to produce more reliable data. When comparing yield estimates and actual yields the fields must be measured and all the grain weighted.

3 Production Systems in the Project Area

3.1 Maize/sorghum

The dominate production system in the project area is maize/sorghum. Maize and sorghum are generally interplanted (*relevo*). The sorghum is planted when the maize is doubled over (sometimes called relay planting). The maize is either harvested when it is dry or sometimes left until the sorghum is about ready to harvest. Some sorghum is planted as a monocrop especially if the main purpose is to graze cattle or to cut the sorghum for cattle.

3 1 1 Maize/sorghum system in El Peñon

3 1 1 1 Maize planting

Soil preparation starts in mid-April and continues until mid-May. This consists of applying Paraquat and/or a atrazine (Gesaprin) or Hedonal (2,4-D salt) at the rate of approximately 2-3 lbs/mz. This burns most of the weeds and if atrazine is included provides residual control. A small number of growers still plow their ground, but also apply herbicides. Most growers in hillside areas do not plow, nor do they burn last year's stubble.

Some of the growers apply a seed treatment (approximately 40% - Diagnostico, 1994) with such products as Gaucho (Imidacloprid) and Marshall. Planting is from mid-May until mid-June depending on the rains. Growers plant a wide range of hybrid varieties, such as H-5, H-53, H-57, H-B833 and H-56. These varieties were developed by CENTA. The same seed is used at least two years and sometimes three. Growers told me yields are low by the third planting. There are still some open pollinated varieties grown which are known as *Senteticos*. Intra-row spacing is between 40-45 cm and inter-row spacing 80-90 cm. Two to three seeds are placed in each hole. Most hillside growers plant maize by hand with a "chuzo" -- a steel-tipped digging stick -- through the stubble and herbicide-killed weeds.

There is no fertilizer applied before planting because the growers want to see if the seed germinates before applying fertilizer. A "complete" fertilizer (16-20-0) 200-400 lbs/mz is applied 8-10 days after planting on top of the ground and sometimes mixed into the soil. A second fertilization takes place 35-45 days after planting when ammonium sulfate (21-0-0) 400 lbs/mz is applied. This second application is also applied to the soil surface by most growers. CENTA is trying to promote the use of Urea (46% nitrogen) instead of ammonium sulfate to slow down the acidifying effect of the sulfur.

Pest control starts at planting when Volaton (Phoxim) or Counter is applied in the seed hole as the maize is being planted. This provides partial control from gallina ciega and other soil insects. One or two additional foliar applications are made to protect the stock and ear during the growing season. Materials used are Folidol (Parathion), Volaton (Phoxim), etc.

One or two hand weedings are carried out in addition to the herbicides applied per plant. An additional herbicide application is made when the maize is doubled over (August/September) in preparation for sorghum planting. Paraquat is the main herbicide used at this time.

The maize is harvested in November/December by removing the ears. The maize is shelled either by hand or with a stationary machine. Custom machine shelling is common in the project area. The grain then is either sold or stored for later sale. Three year (1992-94) average yields were 38 hundred weight per manzana (=2465 kg/ha)

The main problems observed were insects (gallina ciega, earworms and termites) and soil erosion

3 1 1 2 Sorghum planting

As mention above the sorghum is interplanted in the maize when it is doubled over. The sorghum is planted between the maize rows after the soil is prepared by applying paraquat

Varieties are selected on the basis of use (cane or grain). *Panameño* is mainly for cane production for animals while other varieties such as Guateco or Mitlan are for grain. Many of the varieties grown were originally developed in Guatemala

Sorghum seed is very small and planted at high rates (6-8 seeds/hill). The plants are then sometimes thinned to 3-4 plants. From observations in the field, this is a good practice since when the plants are not thinned weak plants are evident

Fertilizer practices are similar as with maize except only approximately one-half the amount is applied to sorghum. The same soil and foliar pests attack sorghum as maize and the growers use the same materials to control them

Sorghum is harvested in December by cutting off the plant and allowing it to dry in the field. The seed heads are removed in January and February and thrashed. Three year (1992-94) average yields were 29 hundred weight per manzana (1883 kg/ha)

3 1 2 Maize/sorghum system in Guaymango

3 1 2 1 Maize planting

Soil preparation is similar as in El Peñon except this area does not use any tillage. All soil preparation is with the use of herbicides (paraquat, 2,4-D and atrazine) to burn down the weeds and give residual control. Planting takes place the last half of May depending on the rains

Improved maize varieties planted are H-5, H-53, H-56, CENTA Pasaquina and Cargil 385 (suppose to have drought tolerance) There are still some open pollinated varieties grown such as *Sintetico*, *maravilla* and *mejicano*, but most varieties are now hybrids As in El Peñon the growers save their own seed for 2 to 3 years They purchase new seed after this time, but it may be from another producer who saved his own seed The seed is treated with the same materials as used in El Peñon Seed is planted by using a planting stick (2 seeds per hole) at a 0.90 x 0.40 cm spacing (approximately 25 lbs/mz) Other cultural practices, pest problems and harvesting periods are similar to El Peñon Guaymango yields in 1993 averaged 36.5 hundred weight which were 1 hundred weight lower than El Peñon (2370 kg/ha)

Yields in Guaymango were 970 kg/ha in 1973, rising to 3200 kg/ha in 1983 using new tillage and fertilizer practices It's unclear whether yields have actually fallen since 1983, but there has probably been no rise in yields for over 10 years

3.1.2.2 Sorghum planting

Sorghum is planted the first half of July in the maize at the same spacings except 6 to 8 seeds (approximately 8-10 lbs/mz) are planted then thinned to 3 to 4 The varieties grown vary from those in El Peñon Guateco (used in El Peñon) is grown along with Chapin, Corona and ISIAF Dorado (improved variety) Cultural practices are similar as in El Peñon Yields in 1993 were 35 hundred weight (2270 kg/ha) which was 10 hundred weight higher than El Peñon

3.1.3 Maize/Sorghum system in Cara Sucia

3.1.3.1 Maize planting

Maize is planted in May and June using the same system as El Peñon Varieties do vary since there is more influence from Guatemala in this area Hybrid varieties being grown are HB-833, H-5, H-53 HS-17 and ICTAB-1 (Guatemala) There are still open pollinated local varieties such as *Sintetico Ulupise* and *Maravilla* grown Growers indicated they listened to Guatemala radio and received technical information through the radio Guatemalan varieties are continually being evaluated by the growers It was expressed that CENTA has not tested the Guatemala varieties and some that are promoted by CENTA are not readily available

The main disease and pest problems mentioned by growers were "Rabia" (virus), soil insects (cutworms and gallina ciega) and foliar insects (earworm and termites) Reported yields in Cara Sucia are much higher than either El Peñon or Guaymango The three year (1992-94) average yields were 44.6 hundred weight (2895 kg/ha)

3 1 3 2 Sorghum planting

Sorghum is planted between the maize rows when it is doubled over (August) using the same system as El Peñon. Local varieties are the main ones used such as Bola, Sapa Lerdo, Santaneco, Panameño and Punta Lanza. There are some improved varieties planted either from CENTA or Guatemala such as ISIAP Dorado, Guateco, Mitlan and CENTA S-2.

Gallina ciega and termites were observed in the field and growers indicated they were problems in sorghum. Some control measures are available for gallina ciega, but timing is critical. Termites seem to have increased in the last few years and controls are just being tested. Sorghum yields are lower in Cara Sucia than in the other two areas.

3 2 Maize/sesame

The sesame that is planted in the project area is concentrated in the El Peñon extension area. Sesame is interplanted in maize when the plants are doubled over (mid-July to mid-August). Varieties are generally local material with variable agronomic characteristics and low yields. The soil is prepared in the same way as sorghum. Weeds are eliminated with herbicides (paraquat or 2,4-D). The seeds are very small and plants must be thinned after planting. This takes place shortly after plant emergence.

There is no fertilizer applied before planting. A "complete" fertilizer (16-20-0) 300 lbs/mz are applied 8-10 days after emergence. Twenty days after planting (plants are approximately 40 cm high) 200 lbs/mz 21-0-0 are applied to the soil surface.

The seed is treated with the same products as with maize. Also, the area around the emerging plants is treated with Folidol (Parathion) to control ants. Foliar insects (Diabrotica) are a problem from emergence to flowering and are treated with Tamaron (Methidophos).

The sesame plants are cut off (early November) when the leaves turn yellow and start to fall off. The plants are bundled, placed in groups and left to dry.

3 3 Maize/Beans

Bean planted area has decreased in recent years with the increase in virus problems. Most beans planting are concentrated in the higher areas and are interplanted with maize. Beans are interplanted to the side of the maize row (60 cm between rows and 20 cm between plants - three seeds/hill) in September. The seed is treated with Gaucho (Imidacloprid). Most of the beans are not fertilized. Some growers do apply 16-20-0 (200 lbs/mz) on top of the soil once the beans have emerged.

The varieties grown are mainly red types with a small amount of black beans. Most varieties are locally produced such as Rojo de Seda, Chacalín, Tineco rojo, Sangre de toro and Quilite. Some of these are probably the same variety. CENTA is introducing some new varieties to encourage production in lower areas. This effort is just starting and it remains to be seen if the varieties will be accepted.

Beans have a number of problems which reduced the area planted. Virus is probably the main cause which can be transmitted through the seed and will survive in plants around the field. Three or four other diseases can be transmitted through the seed. These diseases are spread as the growers continue to use their own seed.

Beans are ready to harvest in November and December with yields ranging from 5-18 hundred weight/mz (325 - 1170 kg/ha).

4 Conservation Practices Promoted in the Project Area

4.1 No burning of crop residue

Most producers in the project area do not burn crop residue. One producer informed me that people in his area burned until 5 or 6 years ago, but now they own their land and do not burn any longer. This should provide good cover for the next cropping season thus reducing soil loss. However, many growers in the project area either turn their cattle onto the land after harvest, rent the land to someone else for grazing, are a member of a cooperative which turn their cattle onto the land, or are renters and the landowner puts their cattle on the land. This practice removes much of the cover which would be available for the following cropping season. It also compacts the soil.

People who rent their land have no control over the landowner's cattle thus see little advantage to improving their soil. In fact, some landowners require renters to plant certain varieties of sorghum (i.e. Panameño) since it provides more forage.

4.2 Use of live barriers

Pineapple and vetiver grass are the two main live barriers used. Growers like the pineapple since they see this as another crop to harvest. It remains to be seen whether pineapple will produce enough product under these conditions. There was a very good rainy season in 1995 which has provided good moisture for growth. Farmers are interested in expanding their pineapple plantings.

Vetiver grass is something new in the area and farmers are trying to figure out what they can do with it. They would like to have materials which could be used for another purpose than just for soil conservation. Some growers do see the need to plant for conservation purposes and this should be emphasized. Proper plant spacing is important for the vetiver. It will fill in between plants if not spaced properly, but the desired effect takes longer.

4.3 Infiltration ditches

The project area has had several dry years recently which has affected maize and sorghum yields. These ditches provide a way to increase water infiltration. The first ditches were constructed this past dry season. Infiltration ditches must be combined with a live barrier or the ditches will fill with sediment. In some locations there was not sufficient material for the live barriers and you can observe ditches half full of sediment. If infiltration ditches are to be constructed there must be sufficient planting material for the live barriers. It makes the most sense to plant the live barriers first, then the infiltration ditches. Live barriers could be planted one year and the infiltration ditch constructed the following year.

Infiltration ditches are difficult to build, especially in the dry season, and take more labor than what is available at certain periods. During the rainy season there are crops in the field which reduces the likelihood that the farmers will dig the ditches. This practice should be evaluated before promoting on a large scale.

4.4 Contour planting

Even growers who do not burn are not necessarily using contour planting. There appears to be a tendency to plant in a straight line across the slope. This is better than planting up and down the slope, but it does not reduce soil loss as much as planting on the contour.

Trees (Teca, Madre Cacao, and Eucalyptus) have been introduced on the contour in some of the maize/sorghum fields. The problem with the trees is that they have been planted too close together and will quickly shade out the maize or sorghum. The proper spacing was not calculated on many of the fields to determine the proper number of trees. I asked some farmers what they were going to do with the trees. The main answer was firewood. Growers next year will start to see the negative effect of the close-spaced trees.

5 Limitations to the different conservation practices being recommended

• 5.1 Land tenure

Land tenure is the first limitations to adaptation of new conservation practices. People who do not own their land or have long-term control are very reluctant to adopt practices which will cost them time and money when they can not see any return. This is true whether it is an individual or a cooperative. Most of the cooperatives in the project area do not allow their members to use the same piece of land to raise their basic grains year after year. Some charge their members land rental, others simply rotate the plots each year. The one exception to this process in the cooperative Nueva York. They are now assigning plots on a long-term basis and the members are interested in improving their soils.

Until last year, cooperative's board of directors rotated every two years. What one board agreed to do was not necessarily continued with the following board. Board members are now elected for four-year terms. This does not necessarily mean that the following board will continue practices from the previous board, but at least there is more time to institutionalize the process. New board members should be trained in conservation practices as soon as they are elected. They should be sensitized to the need for soil conservation and to the need to maintain permanent structures when they are completed.

Until the land tenure questions are addressed in a satisfactory way, I suggest that only soil conservation activities which do not require building structures be considered with individuals who do not have land titles or control of their land. This would include (1) not burning residue, (2) planting on the contour, (3) restricting cattle grazing on the fields and (4) trying to introduce another crop which may help reduce erosion and improve soil fertility.

5.2 Cattle Grazing

The excess grazing in parts of the El Peñon and Cara Sucia areas has led to continued soil erosion and soil compaction. The cooperatives and individuals turn the cattle into fields after the grain harvest allowing them to consume most of the maize and sorghum stover. There appears to be little effort to control cattle movements. The cattle number should be reduced and movements restricted. This is difficult since the cooperatives and individuals see this as a way to fatten the cattle. Unless cattle grazing systems can be improved permanent conservation practices do not warrant the investment. There are examples in the area where terraces (Cooperative La California) and infiltration ditches (Hoja de Sal) were constructed, but only remnants now remain. In both instances, cattle was allowed to over-graze the areas and the structures were destroyed.

CENTA should put effort into working with the cattle producers on ways to improve their production systems. All the indiscriminate grazing will not be stopped, but hopefully some will be reduced.

6 Conservation practices to promote in the project area

Under section 4.1 are mentioned four practices which are applicable to all producers in the project area (not burning crop residue, planting on the contour, restricting cattle grazing and introducing a green manure crop) whether the producer has a land title or not. Construction of permanent structures should only be encouraged where producers do have a land title or control of the land for long periods. All the practices have been discussed under sections 4 and 5 except planting a green manure crop.

6.1 Green manure crops

Green manure crops can be used to improve soil fertility, reduce erosion and with some crops improve human and animal nutrition. There are three which should be evaluated in the project area. They are:

6.1.1 Cowpea (*Vigna sinensis*)

Cowpeas can be intercropped with maize/sorghum and are drought tolerant. The cowpeas can be planted at the same time as the maize or a little later. Determinate or semi-determinate cowpeas can be harvested in 60 to 80 days. When the maize is doubled over the sorghum can be planted which is the standard relay cropping practice. This will provide the farmer with another food source, provide cover to the soil for weed and erosion control, and provide additional organic matter to the soil. If the cowpea is harvested as dry seed little nitrogen is returned to the soil. Salvadoran farmers are often familiar with cowpea as a food crop, and eat it "green pod".

6.1.2 Mucuna (*Mucuna pruriens*)

Mucuna is very aggressive and if interplanted with maize should be pruned or it will overtake the maize. The leaves can be fed to animals which will give a reason for pruning the plants. The best way to plant mucuna would be in a rotation with maize and sorghum. The mucuna could then be worked into the soil or several cuttings could be taken before incorporating to feed to animals. There are areas in all three extension zones where farmers do leave some land fallow. These would be ideal locations to plant the mucuna.

A small trial should be planted with mucuna in maize to compare planting mucuna between every row and planting every other row. This will help determine the proper plant population.

Most soils in the project area have a low pH (less than 6) which may affect mucuna growth. This should be evaluated before recommending plantings on a large scale.

6.1.3 Canavalia (*Canavalia ensiformis*)

Canavalia has a determinate growth habit, tolerates droughts and will grow under a wide range of conditions. This is a good option in areas where animals are a problem after maize harvest. The animals will eat it, but prefer most other plants first. It can be intercropped with maize and sorghum. The seeds are toxic to animals and humans.

7 Recommendation Domains

A workshop was held to define the recommendation domains for the three extension offices in the project area. The extension agents used a list of criteria to define the domains for their particular office. Some offices need to reduce the number of domains which they defined. These results are listed in Spanish as prepared by the agencies.

7.1 Dominios de recomendación en la agencia de Guaymango

7.1.1 Características principales de las fincas

Tenencia de la tierra	90% propia
Tamaño de la finca	< 3 mz
Topografía	Laderas
Suelos	Arcillosos
Precipitación	1000-1500 mm
Altitud	Baja, media y alta
Temperatura	28 °C promedio
pH	Acido
Deforestación	Severa

7.1.2 Características y problemas de los productores

Credito informal	70% (con usureros)
Credito bancario	30%
Comercialización	95% (con intermediarios)
Actividad agrícola	Maíz/sorgo
Individualismo	90% (resistencia a agruparse)

7.1.3 Migración - Octubre a febrero (temporada de café)

7.1.4 Sistemas de producción identificados por la agencia*

- 1 Maiz/Sorgo + labranza conservacion de suelos + Aves
- 2 Maiz/Sorgo + labranza conservacion de suelos + Aves + Cerdos
- 3 Maiz/Sorgo + labranza conservacion de suelos + Aves + Equinos
- 4 Maiz/Sorgo + labranza conservacion de suelos + Aves + Frijol
- 5 Maiz/Sorgo + labranza conservacion de suelos + Aves + Bovios

Nota La agencia divido los cinco sistemas por altitud (baja, media y alta) para definir 15 dominios de recomendacion. En la opinion del consultor la agencia debe reducir el número a cinco o menos. Altitud no es un factor muy importante en el area de Guaymango

7.2 Dominios de recomendacion en la agencia de Sonsonate

7.2.1 Variables usados para agrupar productores

- 1 Sistema de produccion
- 2 Tenencia de la tierra
- 3 Capital
- 4 Topografía
- 5 Tamaño de la finca
- 6 Riego

7.2.2 Dominios de recomendacion definida

- 1 Maiz/Sorgo + Aves + Arboles
 - 1.1 Suelo ondulado, capital propio y tierra propia
 - 1.2 Suelo quebrado, tierra arrendada y capital propio
- 2 Maiz/Sorgo + Hortalizas + Aves + Arboles
 - 2.1 Suelo plano-ondulado, capital propio, tierra propia, con riego
 - 2.2 Suelo ondulado, capital propio y tierra propia
 - 2.3 Suelo quebrado, capital propio y tierra arrendada
- 3 Maiz/Sorgo + Maiz/Ajonjolí + Aves + Arboles
 - 3.1 Suelo ondulado, capital propio y tierra propia
 - 3.2 Suelo quebrado, capital propio y tierra arrendada
- 4 Maiz/Sorgo + Maiz/frijol + Aves + Arboles
 - 4.1 Suelo ondulado, capital propio y tierra propia
 - 4.2 Suelo quebrado, capital propio y tierra arrendada
- 5 Maiz/Sorgo + Bovinos + Potreros + Aves + Arboles
 - 5.1 Suelos planos, capital propio, tierra propia y riego (> 8 mz)
 - 5.2 Suelo ondulado, capital propio, tierra propia y riego (< 9 mz)

5 3 Suelo ondulado, credito y tierra propia

6 Maiz/Sorgo + Hortalizas + Flores + Aves + Arboles

6 1 Suelo plano, capital propia, tierra propia y riego

6 2 Suelo ondulado, capital propio, tierra propia y riego

6 3 Suelo ondulado, capital propio, tierra arrendada y riego

6 4 Suelo quebrado, capital propio, tierra arrendada

Nota La agencia divido el area en 16 dominios de recomendacion Varios de estas puede hacer reducidas dependiendo los actividades

7 3 Dominios de recomendacion en la agencia de El Peñon

7 3 1 Variables usada para agrupar productores

1 Altitud - msnm

2 Tenencia - Arrendatario or propietario

3 Tamaño de la finca - pequeño (<3 mz), mediano (3-8 mz) y grande (>8 mz)

4 Sistema de produccion

5 Acceso al capital

6 Tipo de suelo

7 3 2 Sistemas de produccion principales

1 Maiz/Sorgo + Ajonjoli

2 Caña

3 Ganado - pasto

4 Cafe - frutales

5 Arboles

6 Maiz/frijol + Maiz/Sorgo + Ganado + Aves

7 Maiz/Sorgo + Ganado + Aves + Cerdos

8 Maiz/Sorgo + Aves + Arboles

9 Maiz/Sorgo + Aves + Hortalizas

10 Maiz/Sorgo + Aves + Arroz + Cerdos

11 Maiz/Sorgo + Aves + Frijol + Abejas

12 Maiz/Sorgo + Aves + Ajonjoli + Ganado

13 Maiz/Frijol + Ajonjoli + Sorgo + Aves

14 Maiz/Frijol + Ajonjoli + Sorgo + Aves + Ganado + Cerdo

7 3 4 Caracteristicas de los dominios de recomendacion

1 Propietarios pequeños o medianos ubicados en valles intermedios con cultivos de granos basicos, especias menores, ganado, arboles, hortalizas con suelo arcilloso y accesibilidad al credito

- 2 Propietarios pequeños y medianos ubicados en la zona baja con cultivo de granos básicos, especias menores, ganado, hortalizas con suelos francos arcillosos a francos arenosos y accesibilidad al crédito
- 3 Propietarios pequeños y medianos ubicados en la zona alta con cultivos de café, granos básicos, árboles, ganado con suelos francos a francos arcillosos y accesibilidad al crédito
- 4 Arrendatarios pequeños ubicados en la zona baja, media y alta con cultivos de granos básicos y especias menores, suelos francos, francos arcillosos a francos arenosos y acceso al crédito
- 5 Grandes propietarios ubicados en la zona media y baja con rubros de pasto/ganado y granos básicos, suelos francos arcillosos a francos arenosos y acceso al crédito
- 6 Grandes propietarios ubicados en zona alta con pasto/ganado, café, granos básicos, con suelos francos a francos arcillosos y acceso al crédito

Nota La agencia definió 12 dominios de recomendación en el área. De estas 12 quizás 10 son importantes para CENTA.

7.4 Dominios de recomendación en la agencia de Cara Sucia

Nota La agencia de Cara Sucia diseñó su criterio para agrupar agricultores y describió los sistemas de producción. Necesitan delimitar los dominios uno por uno y asegurarse el criterio que usa.

7.4.1 Criterio para agrupar agricultores y sistemas de producción

- | | | |
|-----|-----------------------------|-------------------------------------|
| 1 | Maíz/Sorgo + Aves | |
| 1.1 | Tenencia de tierra | Propia
Arrendada |
| 1.2 | Tamaño de la finca | Menos de 3 mz |
| 1.3 | Capital | Banca
Propio
Crédito informal |
| 1.4 | Topografía | Ondulado
Plano
Quebrado |
| 2 | Granos Básicos + Hortalizas | |
| 2.1 | Tenencia de tierra | Propia
Arrendada |

2 2	Tamaño de la finca	Menos de 3 mz
2 3	Capital	Banca Propio Credito informal
2 4	Topografía	Ondulado Plano Quebrado
3	Maiz/Frijol + Aves + Arboles Dispersos	
3 1	Tenencia de tierra	Propia Arrendada
3 2	Tamaño de la finca	Menos de 3 mz
3 3	Capital	Banca Propio Credito informal
3 3	Topografía	Ondulado Quebrado
3 4	Precipitacion	Normal
3 5	Temperatura	de 24 a 26 °C
4	Maiz/Sorgo + Bovino	
4 1	Tenencia de tierra	Propia
4 2	Tamaño de la finca	Mas de 3 mz
4 3	Capital	Banca Propio
4 4	Topografía	Ondulado Plano
4 5	Tipo de Pasto	De corte Pastoreo
5	Granos Basicos + Forestales	
5 1	Tenencia de tierra	Propia
5 2	Tamaño de la finca	0 5 a mas mz
5 3	Capital	Banca Propio
5 4	Tipo de suelo	Arcillosos Franco arcillosos Franco arenosos
6	Maiz - Ajonjolí	
6 1	Tenencia de tierra	Propia Arrendada
6 2	Tamaño de la finca	Menos de 3 mz

- | | | |
|-----|------------------------------|--|
| 6 3 | Capital | Banca
Propio |
| 6 4 | Tipo de suelo | Credito informal
Franco arcillosos
Franco arenosos |
| 7 | Sandia, melon, mani, platano | |
| 7 1 | Tenencia de tierra | Propia
Arrendada |
| 6 2 | Tamaño de la finca | > 5 mz |
| 6 3 | Capital | Banca
Propio |
- 8 Variables para Agrupar Agricultores y Comensar a Foramar Dominios de Recomendacion

El Centro de Desarrollo Tecnológico Izalco - Supervisoría Zonal II Sonsonate desarrollo una lista de información (variables) para caracterizar los agricultores en la zona. La idea era de coleccionar la información de los productores enlace y analizar por computadora. El formato que fue diseñado, incluyó 85 variables que son demasiado para los extensionistas. Ellos tienen varias cosas de hacer no solo llevar papeles.

El grupo en el taller trabajo para reducir el número de las variables. Hay 19 variables básicas y otros dividido por grupos de cultivos o producción animal. Solo necesitan llevar los que son aplicables. Las variables pueden ser analizadas a mano o por computadora.

VARIABLES PARA CARACTERIZAR AGRICULTORES

A Variables Generales

- | | | |
|---|--------------------|-------------------------------|
| 1 | Tenencia de tierra | Propia
Arrendada |
| 2 | Tamaño de la finca | <3 mz
3-8 mz
>8 mz |
| 3 | Topografía | Plano
Ondulado
Quebrado |

4	Mano de obra	Familiar Contratada Combinacion
5	Edad del productor (a)	_____
6	Financiamiento	Propia Banca Credito informal Combinacion
7	Sistema de Cultivo	Monocultivo Asocio Relevo Multicultivo
8	Obras de conservacion	Si No
9	Riego	Si No
10	Preparacion de suelo	Manual Traccion animal Mecanico Combinacion
11	Control de malezas	Manual Quimico Semi botanico Combinacion
12	Temperatura	_____ °C
13	Precipitacion pluvial	_____ mm
14	Altitud	_____ msnm
15	Vientos	Si No

16	Inundaciones	Si No
17	Tipo de suelo	Franco Arcilloso Arenoso Limoso
18	pH	_____
19	Salinidad	Si No

B Variables Especificas

B 1 Granos Basicos

20	Tipo de semilla	Certificada Criolla Mejorada Segunda
21	Control de plagas	Si No
22	Control de enfermedades	Si No
23	Fertilizacion	Adecuada Inadecuada
24	Area de cultivo	_____Mz
25	Almacenamiento	Silo Troja Sacos
26	Destino de produccion (mayor parte)	Venta Consumo

B 2 Producción Animal

27	Tipo de animal	Bovinos Aves Cerdos Equinos Abejas
28	Sistema de reproduccion	Monta natural Monta Controlada Inseminacion Artificial
29	Area de pastoreo	Natural Mejorada
30	Tipo de pasto	Corte Pastoreo
31	Conservacion de follajes	Si No
32	Vacunacion	Si No
33	Produccion	_____ Volumen
34	Destino (mayor parte)	Vento Consumo
35	Desparasitacion	Si No
36	Tipo de alimentacion	Concentrados Granos Sub productos Combinacion
37	Equipo	Si No
38	Manejo	Estabulado Semi-estabulado Aire libre
39	Proposito (segun especia)	_____

40	Razas	Criollo Mejorado
B 3 Hortalizas		
41	Tipo de semilla	Mejorada Criolla Certificada
42	Desinfeccion de semilleros	Si No
43	Control de plagas	Si No
44	Control de enfermedades	Si No
45	Fertilizacion	Organica Quimica Combinacion No
46	Destino de la produccion (principal)	Consumo vento
B 4 Agroindustrial		
47	Tipo de semilla	Mejorada Criolla
48	Control de plagas	Si No
49	Control de enfermedades	Si No
B 5 Forestales		
50	Especies forestales	Si No

51	Sistemas agroforestal	Arboles dispersas Cercas vivas Callejones Bosquetes
52	Especies	Nativas Exoticas
53	Uso de la produccion (principal)	Leña Madera Postes Semilla
54	Destino de la produccion (Principal)	Vento Consumo

RESULTADOS DEL ANALISIS DE SUELO

Tipo de Suelo	No de muestras	pH	Fosforo (ppm)	Potasio (ppm)
Arcilloso promedio	28	5.0-6.9 5.7	1-14 5	70-200* 154
Franco Arcilloso promedio	11	4.9-6.1 5.6	3-17 6	85-200* 167
Franco Arenoso ¹ promedio	10	5.3-6.4 5.6	12-38 25	66-200* 101
Franco promedio	3	5.3-5.8 5.5	1-5 4	95-200* 123
Franco Limoso promedio	3	5.5-5.8 5.6	2-5 4	95-200* 165
Franco Arcillo Limoso promedio	3	5.5-6.2 5.7	2-7 4	195-200* 198
Arcillo Limoso promedio	2	5.2-5.6 5.4	3	200*
Limoso	1	5.9	1	200*

1 Franco Arenoso muestras son del oeste del carrerera litoral La mayor parte son de la comunidad El Zapote

RENDIMIENTOS Y RETORNO PARA MAIZ EN EL PEÑON

Año	Area de muestra (MZ)	Area Promedio	Rend QQ	Precio/QQ	Ingreso ¢	Costs ¢	Retorno ¢
1991	72	2 30	15 75	65 00	1020 28	1496 43	-476 15
1992	59 5	2 50	37 15	65 00	2470 56	1491 15	979 41
1993	164 9	1 80	37 53	60 90	2300 62	1902 06	398 56
1994	192 4	1 97	40 01	79 47	3174 00	1995 88	1178 12

RENDIMIENTOS Y RETORNO PARA MAIZ EN CARA SUCIA

Año	Area de muestra (MZ)	Area Promedio	Rend QQ	Precio/QQ	Ingreso ¢	Costs ¢	Retorno ¢
1992	102 29	2 05	48 12	50 00	2406 00	1629 94	776 06
1993	40 32	2 12	46 56	62 50	2915 10	2189 41	725 70
1994	159 91	1 93	40 00	77 50	3159 18	2255 52	903 66

RENDIMIENTOS Y RETORNO PARA SORGO EN EL PEÑON

Año	Area de muestra (MZ)	Area Promedio	Rend QQ	Precio/QQ	Ingreso ¢	Costs ¢	Retorno ¢
1991	71 25	1 89	27 00	47 50	1335 00	601 40	733 60
1992	110 10	1 80	28 24	44 50	1254 49	848 17	406 32
1993	206 05	1 91	25 16	48 82	1302 17	860 70	441 47
1994	206 05	2 01	34 90	57 50	2010 71	983 05	1027 66

RENDIMIENTOS Y RETORNO PARA SORGO EN CARA SUCIA

Año	Area de muestra (MZ)	Area Promedio	Rend QQ	Precio/QQ	Ingreso ¢	Costs ¢	Retorno ¢
1992	47 76	1 91	27 15	44 84	1160 70	900 00	259 72
1993	22 75	2 07	21 15	55 00	1162 70	866 25	296 45