

INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

IMPROVING AGRICULTURE: THE REAL CHALLENGE OF THE
XXI CENTURY

JESSICA AIDEÉ MORA GALVÁN
WORLD FOOD PRIZE 2008



IMPROVING AGRICULTURE: THE REAL CHALLENGE OF THE XXI CENTURY

Nowadays, one of the most important problems all around the world is not only the food insecurity, but also the low agricultural productivity. As it is mentioned in the World Food Program “ten million people die every year of hunger and hunger-related diseases”; this rate is only a sample of the necessity of improving new agricultural extension programs in order to offer education and advisory services to family farmers for implementing technologies and practices from research and development efforts.

Only in Mexico 5% is undernourished; according to WFP, 2008. This problem is originated by many factors for example, there is not enough money to buy food, many people does not have enough sources to cultivate crops or if they have the resources, the crops are frequently destroyed by flood or insects. Another problem is the low salaries that have existed since many years ago and as a result, we found poverty. Poverty is defined as “an economic condition of lacking both money and basic necessities needed to successfully live, such as food, water, education, healthcare, and shelter” (World Bank). The World Bank defines extreme poverty as living on less than 1US\$ per day, and moderate poverty as living on less than 2US\$ a day”. Forty percent of the world’s population has to live with almost one dollar per day; it means, they have to avoid “luxuries” such as cloths, furniture, shoes, with the purpose of keeping their salary for buying food or health products.

In Mexico, 50% of the population lives in poverty, 40% of it lives in moderate poverty because they have to live with less than 2US\$ dollars per day and the other one fifth lives in extreme poverty; it means that they have to live with less than 1US\$ dollar per day (World Bank, 2008). For the percentage of the population living in extreme poverty, only a one quarter of it lives in urban zones; the rest of that live in rural zones working as farmers or without any work. Between 1996 and 2002, extreme poverty decreased by 17 percentage points to 20 percent; even though it is significant, it is not the solution, we have to increase the levels of poverty in order to give them better conditions, but the most important thing, in order to give them food.

The problem of under nourishment is taken by the hand of agriculture: if we do not improve our agricultural productivity, Mexican population will continue like this. In Mexico, farm families are more common than we think; 23.4% of our population comes from a farm family. A typical Mexican farm family has about seven to ten members, and it is conformed by parents, three to four children and another extra member such as grandparents; all of them have to live in a small house with only the necessary things because of their salary. In addition to it, each member has to work in order to achieve the necessary money to eat and to survive. Boys have to work since they are 5 or 6 years old while the girls have to learn how to do housework and they also have to take care of their younger brothers or sisters. Anyway, if it is required, they also have to participate in farm work. As a result of it, they cannot assist to school, they have to be pulled out, or if they assist, they have to walk long distance in order to arrive and they do not lunch to eat.

In order to produce more, all the family members have to participate. The land’s workers include both, men and women. For the 100% of Mexican active economic population (group of persons over 14 years-old that is not studying but working and earning a salary), 6% of women are working at agriculture, and 24 % of men are doing the same. In this rate, the children are not considered because of their ages, but they are an important part of the land work.

Another problem facing Mexican agriculture is the lack of land. Mexico has not so much fertile land to cultivate. From the 100% of Mexican land, 33.7% has Woods or forests; 13% is arable land, 52 %

has other uses of land, and only 1.3% is used for crops. For that percentage, all the farm families' needs a little part and they only have approximately 5 acres for cultivate.

The principal product they grow is corn, basically because it is the base of Mexican diet. Moreover, they use it for their own feed because they do not have the necessary money for including meat on their diet. To ensure a good crop, the farmers have to know the best weather conditions for each crop.

In addition the weather in Mexico varies depending the months. For example in July, it is hot but with many rains; in February-April it is dry and in December-January it is cold. Each product has specific months in order to grow better. For example, for farmers the best months for crops corn are July-September, so the family farmers cultivate that product. Anyway, as a result of the pollution and the global warming, the farmers have been affected because of the weather change.

One of the most significant problems of the Mexican agriculture land is land degradation. Land degradation is defined as "the reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest or woodlands resulting from natural processes, land uses or other human activities and habitation patterns such as land contamination, soil erosion and the destruction of the vegetation cover." (OECD, 2001). This problem affects approximately 65% of the productivity lands by provoking a big decrease in Mexican economy; "it is estimated that losses of nutrients and productivity in agricultural and grazing areas costs over \$2 billion a year, losses due to salinization approach \$1 billion and the costs of deforestation are up to \$0.5 billion making a total impact 6%-5% of NDP" (Cambell, 2003). There are many causes for land degradation, for example water erosion causes the 37% of it; wind erosion 15%, Chemical degradation 7%, Physical Degradation 2%, and biological degradation 4%. (SEMARNAP, 1999). Anyway, the most important degradation is the one in which human induce it; according to the Food and Agriculture Organization (FAO) the land degradation has 5 levels and humans affects them in many ranges, for example, the total area with none degradation by human is about 36%, with light degradation 10%, Moderate degradation 9%, Severe degradation 27%, and very severe 18%. It has also been proved that land degradation is taken by the hand of poverty, agriculture, and migration. According to Cambell, 700,000 – 900,000 people migrate from Mexico's dry lands annually.

So, agriculture affects deforestation, which is now progressing at a rate of 600,000 hectares a year, is creating severe soil erosion in many areas (Melville, 2002). Furthermore, as it is mention in the same article, "the original forest and woodland cover in Mexico was 55% to 57% of the country, of which about 60% remains"; anyway, the rate of deforestation continue growing as the government of Mexico says: 1.36% of forest and woodland decreased per year. There are many causes for deforestation, but the most important are burning, logging for wood and fuel and expansion of agriculture. This problem represents "a current annual rate of loss of forests of 600,000 ha may be equivalent to a loss of \$75m a year to \$500m a year (based on loss of woodland resource and estimated return to agriculture)" (WRI, 2000).

Both, land degradation and deforestation, represents a high cost for Mexico's agriculture. Agricultural production soil & nutrient losses represents \$2.1 billion less, Salinization 0.75 billion, and Deforestation 0.35 billion making a total of \$3.20 billion less for Mexico's economy. In addition, it makes the cost of farming higher and as a result of it, Mexican farmers cannot afford for farm inputs as fertilizers, pesticides or seeds Trade Leads for increasing the nutrients of their corps. Besides it, the farmers left their land and migrate to the frontier, affecting once more Mexican agriculture.

In order to avoid these problems, government should build new agricultural extension programs offering education and advisory services to family farmers for implementing technologies and practices

from research and development efforts. Moreover, we should consider biotechnology in order to get better crops.

In Mexico biotechnology has had many changes. It was introduced by Luis Herrera-Estrella and Francisco Bolivar who found the Biotechnology Institute of the National Autonomous University of Mexico (UNAM). Nowadays, we found 98 institutions dedicated to many aspects of biotechnology; 61% of them is working in themes of agriculture, 30% in food and raw materials, 30% in health, 19% in control of contamination and environmental areas, 13% in cattle-rearing activities, and 9% in marine biology.(Possani, 2003). Amid 15% of those institutions are consolidated centers, 28% are medium level, and 57% low-level development. Mexican biotechnologists have participated in discussions about the development of field and initiatives for biosafety regulation; this should help for solving the problems mentioned before. There also exist some small private initiatives such as Agrobionsa which is producing biologically obtained insecticides. Another example of the thing that Mexico biotechnology had made is: “Scientists in Mexico have produced maize and papaya that are tolerant to the high levels of aluminum that significantly impede crop plant productivity in many developing countries” (BIO, 2008). In 2006, Mexico produced 0.2 million of GM Crops. Moreover, there is a plan to create new biotechnological centers in the field “on environmental protection and microbiology using the biodiversity of Mexico” (Possani, 2003); these centers will also help in agricultural process. In this days government of Mexico “make a proactive decision to support science and technology development with the aim of providing employment for your scientists.” (Possani, 2003)

On the other hand, Mexican agricultural programs have been implemented but there are only two programs for all the country. For example, in Coatepec, Veracruz there exists an Agency named “UNCADER” (Unidad de capacitación para el Desarrollo Rural No 2) which main propose is to help and to assist farmers. This agency has many similarities to the other Agriculture Extension Program. Their goals are “to provide educational assistance and training to small farmers, individual families and the community at large” (Mounts, 2008). This assistance wraps 3 levels:

1.- The first is directed at the unemployed who may want to start a micro business having to do with agriculture, plants or animals: They are supplied with simply courses such as how to heave rabbits, the necessary steps for starting a viable business, and are presented grants for start-up expenses. The arrangement is to facilitate folks to make a job in their own land without having to leave to find work.

2.- It is toward those people who may already have a project in mind (or even in operation): They provide best practices and for this finality the agency provide work for 60 staff which includes MA’s and PhD’s in biology, veterinary science, agriculture, etc.

3.- Advanced training to professionals.

This agency (UNCACER) is located in that zone because of the huge diversity of plants, animals and wildlife that have that state. The weather of that zone allows the crops such as pears, plums and apples (cold weather), and also for coffee (temperate), in the lowland grown pineapples, mangos and papayas. This agency comes out as a very successful and is a great community resource.

The other Agricultural Extension Project (PROCATI), “promotes the setting in place of an extension methodology similar to the Training and Visit (T&V) system to enhance the quality, efficiency and effectiveness of Mexico's extension service.” (PROCATI, 2008) It tries to find a way to improve agricultural productivity and income, and as a result it is trying to find a way to help alleviate rural poverty. Moreover, it also tries to check extension strategies in “20 of Mexico’s192 Rural Development Districts (RDD)” (World Bank, 2008). In addition, it plans to finance, according to World Bank 2008:

- a) Training programs for extension personnel, researchers and farmers
- b) Construction of limited office facilities at the Secretariat of Agriculture and Hydraulic Resources (SARH) service centers.
- c) Procurement of vehicles and equipment for extension and research personnel
- d) Recurrent expenditures of the extension service.

In Mexico, as we have seen before with the samples and statistics, there are many actions to be taken. For avoiding the problems mentioned before, we should improve better and more agricultural extension programs that guaranteed a better life and job for the farm families; this agricultural extension programs should make front to the problems such as deforestation and land degradation and should include biotechnological techniques. In addition, they should cover more areas and their assistance should wrap more than the mentioned before:

- 1.- They should guide farmers to teach each other their own innovations.
- 2.- They should teach not only the crops techniques, but also general culture or at least how to read and write.
- 3.- They should teach basic techniques, for example, how to take care of water, which are the better weather conditions for cropping a specific product, which are the best places for planting a spice, and which are the best products to crop in that zone.
- 4.- They should bring new technology that ensures the productivity of healthier products. For it, we should use biotechnology in order to modify some genes of the crop, “to reduce the environmental impact of farming ... to reduce soil erosion, prevent water loss, and even limit release of greenhouse gases.” (BIO, 2008). We should also use it for make “crossbreeding, hybridization and other genetic modification techniques to improve the yield and quality of food and fiber crops and to provide crops with built-in protection against insect pests, disease-causing organisms and harsh environmental conditions.” (BIO, 2008)
- 5.- They should give support to every farm family.
- 6.- They should ensure fair prices; with it Mexican’s farm families should guaranteed a better quality of life.

We should improve at least 1 of those agricultural extension programs in each zone of the Mexican Republic because each of those has different conditions of weather and land and as a result, different crops. Each of those should follow the rules, but if necessary, they can improve them.

With agricultural extension programs and biotechnology, food security and agricultural productivity would grow up. They would give more confidence and security for farm families and those would have better crops. In this way, all the consumers could remain calm because all of us will know that the crops are of good quality. Furthermore, our atmosphere should not be damaged because the agricultural techniques used should not pollute.

REFERENCES

Melville. Deforestation. 13 May 2002

http://lada.virtualcentre.org/eims/download.asp?pub_id=92083

Cambell, D. Land Degradation In Mexico: Its extend and Impact. 17 October 2003.

http://lada.virtualcentre.org/eims/download.asp?pub_id=92083

World Bank. Poverty in Mexico Fact sheet. August 2008.

<http://go.worldbank.org/MDXERW23U0>

World Food Program. Who are the Hungry? July 2008.

http://www.wfp.org/aboutwfp/introduction/hunger_who.asp?section=1&sub_section=1

Guía del Mundo. México. February 2007.

<http://www.guiadelmundo.org.uy/cd>

OECD. Land degradation. June 2001.

<http://stats.oecd.org/glossary/detail.asp?ID=1494>

FAO. Land resource potential and constraints statistics at country and regional level. 2000.

<http://www.fao.org/ag/agl/agll/terrastat/>

Procati. Agricultural extension project

http://www.wds.worldbank.org/external/default/WDSCContentServer/WDSP/IB/1987/05/28/000009265_3960926055256/Rendered/PDF/multi_page.pdf

Deborah Mounts

<http://www.bellaonline.com/articles/art56101.asp> 2008-09-16

World Bank. Documents & Reports

http://www.wds.worldbank.org/servlet/main?menuPK=64187510&pagePK=64193027&piPK=64187937&theSitePK=523679&entityID=000009265_3960926055256

Possani, L. The past, present, and future of biotechnology in Mexico. May 2003.

<http://www.nature.com/nbt/journal/v21/n5/full/nbt0503-582.html>

Biotechnology Industry Organization. Frequently Asked Questions On Agricultural Biotechnology.

<http://www.bio.org/foodag/faq.asp>

Biotechnology Industry Organization Crop Biotechnology

<http://bio.org/speeches/pubs/er/agriculture.asp>