



Intsormil

TRIP REPORT

MEXICO
OCTOBER 11-17, 1982

by

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Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln



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TO: INTSORMIL Members

FROM: Billie R. DeWalt
University of Kentucky

SUBJECT: Trip Report for visit to Mexico

INTRODUCTION AND SUMMARY

Statistics on grain sorghum cultivation in Mexico were not even collected until the 1958-59 growing season. Since that time, sorghum has become the third-largest crop sown in terms of acreage (after corn and beans). Yields have been averaging a little over 3 metric tons per hectare (see Table I), over twice the yields of corn per hectare (see Figure II and Table II). Much of the best land in Mexico is now sown in sorghum. In the State of Guanajuato (which includes the rich agricultural lands known as El Bajío), for example, the amount of sorghum grown jumped from about 2500 hectares in 1960 to over 222,000 in 1976.

The sorghum that is grown in Mexico is destined for consumption by animals. As the country has developed, there has been increasing demand for animal products by the populace and this has led to increasing demand for livestock food such as sorghum. In spite of the large amount of sorghum produced in the country, Mexico has been unable to produce enough. Table I shows that in the five years between 1975-79 imports averaged over 700,000 tons annually. In 1980, it was estimated that Mexico imported 2,253,923 tons, and that use would be over 100 kilograms per person (Ecotecnia Agricola 1981:59).

During the trip to Mexico, we saw examples of the cultivation that has contributed to this impressive growth of sorghum production. Irrigated fields in El Bajío are getting average yields of over 5 tons per hectare

largely by using hybrid sorghums sold by large seed companies. Nevertheless there are problems in sorghum production in Mexico.

This trip report largely consists of my field notes from the trip in which Fred Miller and John Mann (from Texas A & M) and I visited the regions of Ocotlan, Jalisco; Celaya, Guanajuato; and Zacatepec, Morelos. In these areas I was able to gather some preliminary data from farmers concerning production constraints to production of sorghum. The following points summarize information contained in the notes that follow.

1. In all of the areas that we visited, we were struck by the high plant densities in the fields we saw. Extension workers in all areas recommend that farmers use 15-20 kilograms of seed per hectare and farmers with whom I spoke reported using 1 sack (22.5 kilograms) per hectare.
2. Even small farmers (5-20 hectares) are using state of the art technology (i.e. mechanization, improved seeds, chemical inputs) to grow sorghum. Despite this, it is difficult for them to make much money farming. My calculations for one small farmer with 5 1/2 irrigated hectares showed a maximum of about \$120 profit per hectare even though he was getting yields of 5 tons per hectare.
3. The Mexican government is trying to discourage farmers from growing sorghum and is trying to encourage them to grow corn. The prices that had been established by the government ^{in late 1982} were 8750 pesos (\$125) per ton for maize and 5200 pesos (\$74.29) per metric ton for sorghum.
4. Banks that give credit for growing sorghum sometimes require the farmer to purchase inputs through the bank. In one case that we saw in Morelos the bank was selling seed that was susceptible to downy mildew and head blight, both of which were significant problems in the area.

5. In the El Bajío region, insects seemed to be the most significant constraints, while in Morelos weeds and plant diseases were most important.

Birds, of course, were a problem in all areas. Constraints mentioned included:

El Bajío	Morelos
gusano soldado (<i>Pseudaletia unipuncta</i>)	Downy mildew (<i>Sclerospora sorghi</i>)
pulgon verde (<i>Schizaphis graminum</i>)	Head blight (<i>Fusarium moniliforme</i>)
cogollero (fall army worm)	Grain molds
chinche cafe (<i>Oebalus pugnax</i>)	Pink sheath
ants	Ants

6. Sorghum is all harvested by combines and most of it is sold immediately rather than being stored.

7. I did not encounter anyone who used sorghum for human consumption but I did interview a farmer who had eaten sorghum tortillas and atole at his relatives' house. His description of the sorghums used for human consumption sound very much like the sorghums used in Central America; i.e., they are very tall, white-seeded varieties. I believe there would be little resistance to eating sorghum tortillas since many people are now eating tortillas bought in tortillerias where they are mass produced. A recent report in Grassroots (a journal of the Interamerican Foundation) noted that tortillas from tortillerias were found to contain corn cobs, ground up stale tortillas, and other unappetizing "additives."

8. Sorghum is a crop well-adapted to the uncertain rainfall conditions of such places as Zacatepec, Morelos (where rainfall averages only 500 millimeters a year) and the Bajío (see Table 4 for rainfall data). Even though there are irrigation facilities in the Bajío, three of the past four years have been extremely dry and irrigation water is not always available.

October 12, 1982 - Ocotlan, Jalisco.

1. We arrived in Gaudalajara last night and were taken by Alberto Betancourt to the Hotel Cosada Guadalajara. Also on the plane were Fred Miller, Delroy Collins, and John Mann. John is a Ph.D. candidate in sorghum breeding and Delroy is a technician who works in pathology at Texas A & M with Dick Frederickson.
2. Early in the morning we took approximately one hour to drive to Ocotlan on the shores of Lake Chapala. INA rents some land there for their sorghum breeding program. We met a number of individuals who work with Alberto both in Ocotlan and Chapala.
3. Some things I learned while accompanying them in looking at $F_1 \dots F_4$ populations are the following. One of the things for which they are looking is resistance to *Helminthosporium tericum* - leaf blight. It is a significant problem in the sorghum fields around the lake. Also problems are downy mildew, and a bit of leaf spot (*cercospora*). These have not been much of a problem this year because it has been a very dry year.
4. Fred and John said that approximately 70% of the sorghum sown in Mexico is Wheatland by 430 or Redland by 430. In these hybrids, 430 is the pollinator. About 60% of U.S. sorghum production uses these same crosses although the seed is marketed under many different names by different companies.
5. Around what is called the Cienaga de Chapala (a region around Lake Chapala) the average production of sorghum is about 3-5 tons per hectare. This figure was given to us by one of the Ingenieros. A popular hybrid is Purepecha.
6. He also said the most significant constraints on sorghum production in the region were fusaico (*fusarium*) and downy mildew. He also said that roya (rust) was beginning to appear. Reasons why farmers liked sowing sorghum are

its great tolerance for drought and the demand for it as an animal feed.

7. Perhaps the most surprising thing about sorghum production in the Octolan region is the incredibly high plant densities. They use up to 25 kilos of seed per hectare with a resulting plant density of 280,000 plants per hectare. This is equally true on the experiment station as well as in farmers' fields.

8. Bird populations are also a significant problem around the lake. Birds swarm in any field left unprotected by a farmer. I took a picture of birds in one such field.

October 13, 1982 - Guadalajara to Celaya

1. After spending another night in Guadalajara, we got up early to go to Celaya. On the way we had a flat tire, then discovered that the spare was also flat. Alberto had to hitch a ride into the nearest town to get one of the tires fixed. After that delay, then another delay getting the spare fixed, we arrived in Celaya much later than we had anticipated.

2. We did get to go out to the fields of the Campo Experimental de El Bajio where there were lots of experiments that Fred and John and Alberto wanted to see. The experimental station is quite an impressive place -- nice buildings, a very well-stocked library, and lots of land.

3. We got in to talk with Ingeniero Enrique Elias Calles who is the sub-director of I.N.I.A. for the Central Zone of the country. We talked a bit with him about trying to sign an agreement. He made an appointment with Dr. Jesus Moncada, the Director General of I.N.I.A., for Fred.

4. Many of the people working on sorghum joined us for a pleasant dinner at our restaurant, courtesy fo the I.N.I.A. There was a brief discussion about them taking us to see the city of Guanajuato (several hours drive each way) but we finally dissuaded them.

October 14, 1982 - B.R. DeWalt "Talking with Farmers around Celaya"

1. Fred and John left this morning to go to Mexico City. Fred had an appointment to see Dr. Jesus Moncado de la Fuente who is the current head of the Instituto Nacional de Investigaciones Agricolas. I stayed behind because Ingeniero Juan Francisco Casas Salas of the Campo Agricola Experimental de El Bajio agreed to take me out to talk with some farmers.
2. We first went to Yustus, a community just a few kilometers from Celaya. There we talked with the family of Aucedio Moreno. He is about 60 years old and works land that he received as a member of the ejido (groups of farmers who received land redistributed after the Mexican Revolution) of Yustus. He has rights to a total of 6 1/2 hectares - 5 1/2 irrigated and the other 1 suitable for rainfed agriculture. His land is divided up into 4 separate plots of 3 hectares, 2 1/2 hectares, and 2 plots of 1/2 hectare each.
3. This year he sowed about 2 1/2 hectares of maize and 3 hectares of sorghum. He had to borrow money to sow his crops. Usually he is able to use irrigation water four times but this year there was insufficient water in the reservoir and they were only able to irrigate twice. He said that last year he obtained 10,000 kilos of sorghum from 2 hectares and about 11,000 kilos of corn (this last estimate sounds high). In the winter season they sometimes sow chickpeas (garbanzo porquero); last year these yielded 4 tons (metric) from 2 hectares. They also sometimes sow wheat; the variety he sows is Salamanca S-75 which he said has a soft gluten. They are very much into improved seeds - they sow a maize hybrid called Celaya 2 and the sorghum they sow is NK 280.
4. I asked these people if they ever ate sorghum and they said yes. They said they have eaten sorghum when they visited relatives in the mountains around the Bajio. They said the sorghum tortillas they ate had a good flavor (un sabor muy bonito) much like that of tortillas made with wheat flour. These

tortillas were made from white sorghum. The white sorghums sown in the mountains are very tall (sounds like those in Central America). Local names for it are maiz de pollo (chicken corn), saucena (willow??), and sagu (??). In addition to tortillas, their relatives prepare atole using a mix of sorghum and maize.

It seems pretty clear that some people in Mexico are using sorghum for human consumption, and that if they had food-quality varieties, other people might be willing to use sorghum.

5. The Moreno family sells most of the sorghum they grow. Last year the price paid was about 3900 pesos per ton (about \$85 at the 46 pesos to the dollar exchange rate prevailing in 1982). They kept about 1/2 ton to feed to their chickens and turkeys. They do not feed sorghum directly to pigs (as they do in Honduras) but they said it must be milled first.

They only sold about 1 ton of their maize. They sold it in the village for 10 pesos per kilo. If they had sold it in Celaya, they would only have received 8 pesos per kilo. Thus, selling corn in small quantities, they got about \$217 per ton of corn. I am sure this is a high estimate since rural weights and measures are quite imprecise.

Chick-peas sold last year for 8 pesos per kilo.

6. The Morenos reported that they began growing sorghum about 10 years ago. They began getting irrigation water from the reservoir about 12 years ago.

For the three hectares of sorghum sown this year they used 5 sacks of seed (of 50 pounds each). He said they used so much because they lost the first planting and had to re-plant. (Casas interjected here that the recommended amount of seed is 18 kilos per hectare). The farmer said that they use a lot of seed because they have problems with germination. The fields we saw, however, seemed to be planted too densely. This was an assessment shared by Miller and Mann,

7. The Morenos have a rented tractor to do most of their agricultural operations. Following are the operations and their cost for 1982:

<u>Sorghum operations</u>	<u>Pesos</u>	<u>Dollars (\$1 = 46 pesos)</u>
Plowing	1200/hectare	26.00
Harrow	800/hectare	17.40
Cross-plow (<u>cuadrar</u>)	400/ha.	8.70
Seed	700/ha.	15.20
Cultivate 1st time	700/ha.	15.20
Cultivate 2nd time	700/ha.	15.20

(Note: I have given the exchange rate as it was in early 1982. With the devaluation of the peso in late 1982, the exchange rate will be \$1 = 70 pesos. Tractor rental will undoubtedly become more expensive in pesos).

The same time that they cultivate with the tractor, they also hire laborers to help with the weeding. Laborers in 1982 cost 300 pesos (\$6.50) per day. Their estimates of requirements were that 8 person/days per hectare were needed for both cultivations. The labor costs per hectare would thus be \$52 for weeding.

They harvest their corn by hand but hire a combine to harvest their sorghum. The cost for a combine last year ranged between 35 and 45 centavos per kilo. Most commonly, the combines charge 450 pesos per metric ton (\$9.80) which includes transportation of the grain to an elevator.

The total costs that I have calculated above come out to be \$198.70 per hectare -- the tractor, combine, and some of the labor costs. (This assumes a production of 5 tons per hectare.) SEED COST in 1982 were 1300 pesos per 50 pound sack (\$28.25). This past year they lost the first planting, and they need 1 sack normally per hectare, so that their seed costs were \$56.50 for this year for each hectare. FERTILIZER COSTS were the following. They said that they bought 2 tons of urea for 8,445 pesos in 50 kilo sacks. This means that each 50 kilo sack cost 211 pesos or \$4.59. (Note: They said that fertilizer prices had just gone up 36% in August so their costs next year

will be much higher.) They applied 200 kilos in seeding, and 175 kilos (by hand) during one of the cultivations. Fertilization costs are thus about \$34.50 per hectare. They do not use herbicides but they do use insecticides. They did not know the name of the insecticide they used -- they just knew it as a powder. The main insect with which they had problems were ants. THUS, A MINIMAL ESTIMATE OF THEIR COSTS OF PRODUCTION PER HECTARE OF SORGHUM IS AROUND \$300.

8. If they were able to produce 5 tons per hectare and sold it for 3900 pesos per ton, this would mean that their gross would be \$423.90 and their profit would be \$123.90 per hectare. Because they only have 5 1/2 hectares of irrigated land, their agricultural income would only be about \$680 for the growing season. Note that I have probably underestimated their costs and they have probably overestimated their production. If they only produced 3 tons of sorghum per hectare, for example, they would lose money based on these preliminary calculations.

9. This family's living standard was above that of most of the people we have been studying in Honduras. They had a small brick house with a kitchen separate from the sleeping quarters. They had a couple of cows and a few turkeys and chickens. They also had a gas stove to use for cooking. While this might seem a luxury item, wood is so scarce in this area of Mexico that having an alternative cooking source is vital. The woman of the house told me that they still prefer tortillas cooked over wood so they have to buy it. Wood costs 3 pesos per kilo around Celaya.

One of the things that has helped this family to make it is that their son has been working in one of the factories in Celaya. He still lives at home and has been helping to support the family. Even with the outside source of income and what, by Honduran standards is a lot of good quality land, this family's diet reflects a fair degree of poverty. The day previous to my visit

they had the following meals:

Breakfast

Beans (bought at 25 pesos per kilo)
Milk (from their own cows)
Tortillas
Sweet breads and rolls (they buy 40 pesos worth of bread each day
to be eaten at all three meals)

"Dinner"

Beans
Noodles (fideos)
Tortillas

Supper

Coffee
Sweet breads and rolls

Tortillas are the staple of this family's diets. They grind 7 kilos of maize a day -- 3 1/2 kilos go to their 3 pigs and the other 3 1/2 are for the family. There are only 4 of them living there.

10. This family borrows money every year in order to plant their fields. They said that they borrow it from a friend or acquaintance; they refuse to deal with the banks. I asked them about interest and they said they really do not pay any interest. They said that they borrow from someone to whom they will sell their grain. Apparently they do not have to sell their harvest for much below market prices. The loans seem to be made for future considerations and the family is not faced with paying a high premium to get money to sow.
11. One of the problem with sorghum production is that they can't get crop insurance on it. This is a problem when they are hit with bad weather or an insect plague. Two years ago they were badly hit by the gusano soldado (*Pseudaletia unipuncta*). Other problems mentioned as causing significant damage were pulgón verde (green bug -- *Schizaphis graminum*); cogollero (fall army worm -- *chinche café* (*Oebalus pugnans*); and mosca del sorgo (*Contarinia sorghicola*). These last two were not mentioned by the family but are listed

in the Guide for Cultivating Sorghum in the Bajio put out by the experiment station.

12. The other big problem is there are birds. They mentioned the mulato, tordo and chillon as the worst offenders.

13. Post harvest storage for sorghum is not a problem since it is sold as soon as it is harvested. They said that they can only store their corn for about 3 months, however, because rats and the gorgo jo (*C. granaria* -- maize weevils) are significant problems.

14. Plant diseases were not mentioned by the Moreno family but several have been identified by the experiment station as problems. These include: Downy mildew (*Peronosclerospora sorghi*); carbon de la panoja (head smut -- *Sphaceloteca reiliana*); tizon de la panoja (head blight -- *Fusarium moniliforme*); roya (rust -- *Puccinia purpurea*); and tizon de la hoja (leaf blight -- *Helminthosporium turcicum*).

15. We then went out to the other side of Celaya to find a combine harvesting sorghum. We found a guy with a very large, quite new combine. He said that his brother had recently purchased it for about 2,000,000 pesos (\$43,500). It was an International Harvester, McCormick. The field that they were harvesting was sown with Horizon 80. The guy had no idea how much they would harvest on that land but said that last year they had gotten as much as 8700 kilos per hectare.

16. As we walked around the field where the harvester had passed, it was clear that there was a lot of grain left behind. The man said that there were pepenadores who would get permission from the owner to gather up the seed left behind. They would use this for food for their own animals.

17. The sorghum stalks are left to dry for 4 or 5 days before they are gathered and packed to serve as food for animals.

18. On the way back, Casas pointed out several sorghum processing plants on the outskirts of Celaya. Anderson-Clayton was one of the largest. Casas said that about 30-40% of the sorghum is processed into balanced animal foods, while the other 60-70% is fed directly to animals.

19. Ing. Casas dropped me at the bus station where I caught a bus for Mexico City.

October 15, 1982 - Zacatepec, Morelos

1. At about 8:30 this morning (1 hour late) an INIA driver picked us up at our hotel for the trip out to Zacatepec, Morelos. There is an INIA experiment station there at an elevation of 917 meters. They have experimental fields of corn, sorghum, rice, tomato and other crops. I will return to this later.

2. After lunch, Rigoberto Delgado and Jose Avila took us out to an ejido near the Lake Tequisquetengo. We were fortunate to encounter two men who were fixing a combine that they were using to harvest sorghum. The fellow who owned it said that his father had bought it in 1973 with the proceeds from his sugar cane and sorghum. It cost 190,000 pesos then. At the exchange rate then (12.5 pesos = \$1) that would have been \$15,200. He said he had just asked how much new ones cost and was told 3 million pesos or \$42,857 at current exchange rates (70 pesos = \$1). His old combine was a Ford made in Germany, or at least that is where he had to write for parts. Last time he wrote they gave him an address in Minnesota to use to order parts.

3. Soon after his father bought the machine he died and left it to him. He had 10 brothers and sisters and their father had 75 hectares of ejido land in his and their names. One brother is now working this land.

4. The land he was harvesting was in the Ejido El Reparito and was his uncle's land. His uncle had 19 hectares in three plots. He said the machine could do 20 ha. a day on flat land but they had only started that afternoon, after harvesting in other areas before. He said they had already harvested 16 ha. and had filled 24 tolvas or bins on the combine. The bin held 1800-2000 kilos. So they got 43.2 to 48 tons or a yield of 2.7 to 3.0 tons per hectare. This is considerable given the sorry state their sorghum was in. It had downy mildew and fusarium head blight. This latter kills the panicle before the grains are filled and greatly reduces the weight of the seeds. The hybrid they planted was WAC 694, one that is very susceptible to (Redland by TX 2536) downy mildew and fusarium and has poor drought tolerance. This was seed they were given by the bank which loans them money.

5. They seed the land the following way. A tractor first opens the furrow. Then people drop the seeds in the furrows by hand. The seed is covered by a branch that is dragged by the people who are seeding. They said that there are some people who sow with the tractor. They bought a seeder for their tractor and it worked well the first two years. Now it doesn't work as well so they have gone back to hand seeding. The problem with the sembradora probably relates to the clayey soils; as they said, "la tierra es muy pegado." They said they use less seed when sowing with the tractor. They used 1 bulto of 22.5 kilograms per hectare, a very high plant density. We saw the results of this many plants that never produced heads.

6. The spacing of rows is 70 centimeters. They knew this because they can harvest 6 rows (surcos) at a time. He said they charge 500 pesos per ton to harvest. Two combines and trucks also came from Guanajuato; they are charging 1000 pesos per ton "puesto en la casa" (put in the house). His prices do not include transport costs or unloading.

7. They have a bodega in which they can store the sorghum. It has a capacity of 300 tons. He said many people have their own bodega. The only problem is that they have to keep moving the sorghum around because it molds. Generally they only keep it for 3 months. They sell their grain to Wester Granja Agricola in Cuernavaca. Last year they received about 4500 pesos per ton when they sold it. They said just recently the Granja was offering \$10,000 pesos/ton because of the scarce supply right before the harvest.

8. Harvests there average only about 3 tons per hectare in a bad year like this one although some people get as little as 1 ton per hectare. There was a drought this year and many fields were taken over by weeds. In good years they get up to about 6 tons per hectare. I asked what the typical maize yield would be and he said that they no longer sow corn. There was corn in many places around the lake so I don't know why they don't sow it there, except that he said it doesn't yield in that location.

9. On irrigated lands they have, they sow sugar cane, tomatoes, onions, melons and beans. The problem is that with tomatoes and onions the price goes up and down - last year, for example, everyone lost money on those two crops. Two people planted cotton but there are many insect problems.

10. I asked about constraints on production and they said there were few problems. They mentioned the tordo and zacatero, birds that cause some difficulties. But they said unless there is a lone sorghum field planted somewhere, the damage to any single field is not great. Ants eat the plants when they are small and the cogollero (fall army worm) eats the plants when there are droughts. When it rains, the worms apparently drown and cause a few problems. For the ants, they have someone keep watch (an hormigero) and they put fitoflor on them to kill them.

11. Almost everyone uses fertilizers. Some people apply them when they sow three people sit on the back of a tractor throwing the fertilizer by hand. Others fertilize the sorghum when it is about 30 centimeters high. They mix 2 bultos of Sulfato de Amonia with 1 bulito of Superfosfato Triple de Calcio. The rate of application is approximately 500 kilos per hectare.

12. They also make a lot of use of pre-emergent herbicides applied by tractor. They use Gesaprim and Catoran.

13. Many people receive credit from the bank to sow sorghum. These guys were not sure but they thought that people received about 6,000 (\$130 in early 1982) per hectare for the costs associated with sorghum. The bank actually provides them with many of the inputs like seed and fertilizer. Fred Miller and John Mann were appalled that the bank was distributing the WAC 694 because it is so susceptible to downy mildew and head blight. The combine operator's uncle had actually paid out almost all of the money for inputs into his sorghum when he discovered he had to have an eye operation. He borrowed 50,000 pesos for his 19 hectares of sorghum. They were harvesting his sorghum early so that he could pay back the bank.

14. Everyone in the ejido has to harvest their fields before animals are allowed into graze the fields. The ejido lands are fenced but individual parcels are not. After the harvest, all the people with rights to ejidal (lands redistributed as a result of the agrarian reform) land can put their animals in to graze.

15. Lots of grain falls on the ground when the combine is harvesting. They hire peons to collect up these heads before the animals are let loose in the fields. These heads are ground up (seeds and the rest of the panicle) and fed to animals.

16. They said there was not any human consumption of sorghum in the area.

I asked if there were any white-seeded sorghums and they said very little. They used the term milo which they indicated was the first sorghum grown there. There may be a useful ethnosemantic distinction to be made between soogt and milo when asking about human consumption. Milo seems to refer to the old white-seeded sorghums first grown in Mexico.

17. Jose Avila is the only sorghum breeder at the Experiment Station in Zacatepec. He was supposed to be off somewhere studying for an advanced degree but the country ran out of money for becas (grants) so he went back to his work. Rigoberto I. Delgado Licon is an agricultural economist who will be collecting socioeconomic data in the area.

18. Avila looked up the figures on guaranteed prices for us. The latest figures are a price of \$5200 (pesos) per ton (metric) for sorghum and \$8750 per ton for maize. I believe that one of the policy decisions made as a result of the Sistema Alimentario Mexicano (SAM) - the program to make Mexico self-sufficient in food - was to make the prices for these two grains so discrepant that farmers would begin shifting back to maize production.

19. Weeds seem to be a very significant constraint in southern Morelos.

We saw several fields that were just overgrown with weeds. The people at the experiment station said that it was necessary to cultivate three times and to apply herbicides like Gesaprim and 2-4-D to keep the weeds under control.

20. The extensionists also said that many of the farmers feel like they are just employees of the bank because, when they receive credit, the bank supplies many of the inputs needed to cultivate. The farmer is left with little to do. Yields in southern Morelos are only about 3 tons per hectare on the average. In large part, this is probably due to the fact that the lands are not irrigated and rainfall averages only about 500 millimeters per year.

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21. The other major impression that I received from the Zacatepec area is that insects do not seem to be significant constraints but weeds and plant diseases are. Downy mildew and head blight are very common. Pink sheath and grain molds also appear to be quite common.

22. Late in the afternoon, we returned to Mexico City.

October 16, 1982 - Trip to CIMMYT

1. We got up this morning and an I.N.I.A. driver gave us a ride out to CIMMYT in El Batán. Being Saturday, there were very few people around. I did find Rob Tripp, an anthropologist friend who works in the Economics Division. He took us over to the housing office where we arranged a room for Fred and John for the night.

2. We also checked to see whether Vartan Gourigossian had returned from India yet. Fred needed to talk with him about the planned Breeding Workshop in April. Vartan had not yet returned so we had lunch and I had a chance to talk with Rob about Farming Systems Research. We agreed to exchange some publications.

3. After lunch, Rob took us into the city of Texcoco to help find Fred and John a taxi to take them to see the pyramids at Teotihuacan. He dropped me at the bus station where I caught a bus for Mexico City.

4. I had dinner with an old friend, Larissa Lomnitz (a professor in the Institute of Applied Mathematics and an advisor to the Rector of the Universidad Nacional Autónoma de México). She has several friends who are currently working on the Sistema Alimentario Mexicano (SAM) and she urged me to come to Mexico again soon to meet them.

October 17, 1982 - I left for Tegucigalpa.

Stations Visited

Campo Agricola Experimental de El Bajio
Km. 6 Carr. Celaya - S. Miquel Allende
Apdo. Postal 112
Celaya, Guanajuato
Telephone 2-70-23

Campo Agricola Experimental Zacatepec
Apartado Postal 12
Zacatepec, Morelos
Telephone 2-12-46

TABLE 1: GRAIN SORGHUM: Harvested Area, Yield, Production, Foreign Trade,
and Consumption in Mexico, 1958-1979.*

Years	<u>Average Area Harvested (Hectares)</u>	<u>Average Yield (kgs./ha.)</u>	<u>Average Production (tons)</u>	<u>Average Net Imports (tons)**</u>	<u>Average per capita con- sumption (kgs.)</u>
1958-59	113,393	1478	167,567	5,133	5.036
1960-64	164,964	2090	344,713	51,596	10.268
1965-69	655,302	2568	1,682,627	-100,645	34.586
1970-74	1,071,206	2734	2,928,789	125,408	55.947
1975-79	1,334,221	3114	4,132,952	717,301	76.144

*Source: Secretaría de Agricultura y Recursos Hidráulicos, "Consumos Aparentes de Productos Agrícolas 1925-80", Econotecnia Agrícola Vol V, No. 9, 1981, pp. 58-9. Sorghum statistics have only been collected since 1958.

**This reflects the total imports minus the total exports. A negative number in this column indicates that the country exported more than it imported during that period.

TABLE 2: CORN: Harvested Area, Yields, Production, Foreign Trade,
and Consumption in Mexico, 1925-1979.*

<u>Years</u>	<u>Harvested Area(ha.)</u>	<u>Yield(kgs/ha.)</u>	<u>Total Production(tons)</u>	<u>Net Imports(tons)</u>	<u>Per capita Consumption(kgs.)</u>
1925-29	3,046,447	644	1,960,832	44,346	129.004
1930-34	3,172,821	576	1,827,250	5,426	106.700
1935-39	3,035,604	565	1,715,179	- 1,163	91.443
1940-44	3,405,854	602	2,050,255	34,798	100.760
1945-49	3,558,123	713	2,538,073	8,685	108.443
1950-54	4,620,112	777	3,591,505	119,884	134.290
1955-59	5,783,668	837	4,842,371	346,275	158.916
1960-64	6,528,317	1,021	6,665,499	- 28,361	171.964
1965-69	7,679,118	1,153	8,856,772	-1,020,626	171.316
1970-74	7,349,419	1,207	8,868,970	534,108	173.042
1975-79	6,741,412	1,368	9,196,558	1,527,181	168.351

*Source: Secretaría de Agricultura y Recursos Hidráulicos, "Consumos Aparentes de Productos Agrícolas 1925-1980"
Econotecnia Agrícola Vol. V, No. 9, 1981 pp. 49-50.

**This reflects the total imports minus the total exports. A negative number in this column indicates that the country exported more than it imported during that period.

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TABLE:3 WHEAT: Harvested Area, Yields, Production, Foreign Trade,
and Consumption in Mexico, 1925-1979.*

<u>Years</u>	<u>Harvested Area(ha.)</u>	<u>Yield(kgs/ha.)</u>	<u>Total Production(tons)</u>	<u>Net Imports(tons)*</u>	<u>Per capita Consumption(kgs.)</u>
1925-29	507,661	686	348,192	61,961	26.387
1930-34	500,786	781	390,914	20,311	23.942
1935-39	503,388	772	388,697	29,169	22.293
1940-44	564,072	754	425,212	196,145	30.027
1945-49	498,921	838	417,891	275,950	29.544
1950-54	666,558	960	639,900	315,117	34.555
1955-59	894,281	1,358	1,214,263	21,052	37.834
1960-64	812,323	1,958	1,590,640	-100,596	38.606
1965-69	799,870	2,582	2,065,378	-250,098	39.686
1970-74	720,324	3,108	2,239,154	467,803	49.815
1975-79	745,821	3,674	2,737,025	407,965	49.373

*Source: Secretaría de Agriculture y Recursos Hidraulicos, "Consumos Aparentes de Productos Agricolas 1925-78"
Econotecnia Agricola Vol. V, No. 9, 1981 pp. 63-64.

**This reflects the total imports minus the total exports. A negative number in this column indicates that the country exported more than it imported during that period.

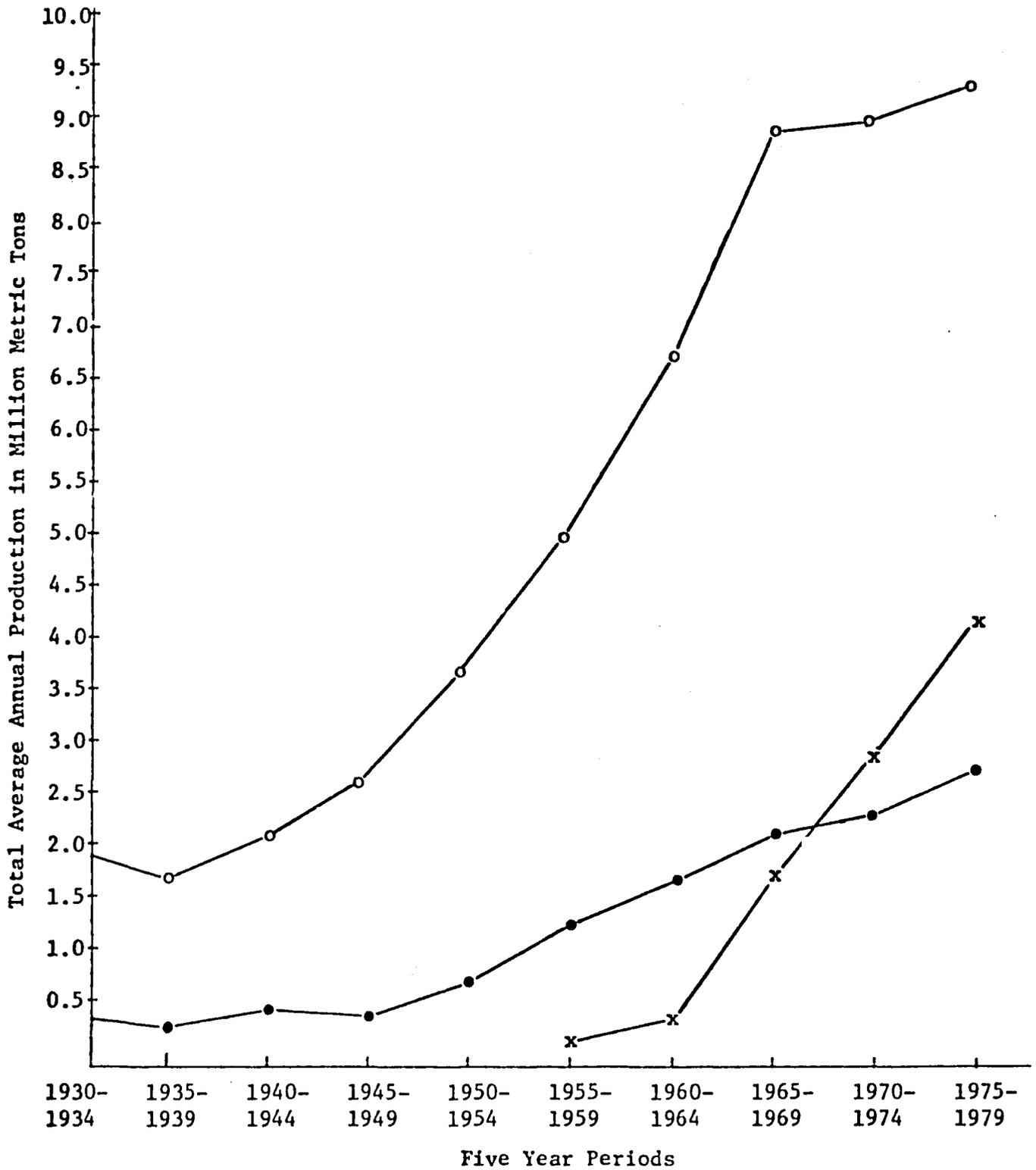
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TABLE 4: PRECIPITATION DATA FROM THE EL BAJIO
EXPERIMENT STATION - CELAYA

	<u>1982</u>	<u>1981</u>
Enero	no data	62.8
Febrero	14.5 mm	21.0
Marzo	5.0 mm	none
Abril	39.3	50.3
Mayo	86.9	44.9
Junio	10.0	137.8
Julio	157.4	109.8
Ago	45.0	91.0
Sept.	70.6	34.8
Oct.		103.9
Nov.		0.0
Dec.		<u>15.1</u>
TOTAL		671.4

- Figure 1 -

TOTAL PRODUCTION OF CORN, WHEAT AND SORGHUM IN MEXICO 1930-1979
(Adapted from Econotecnica Agricola, Vol. V, No. 9, Sept. 1981)



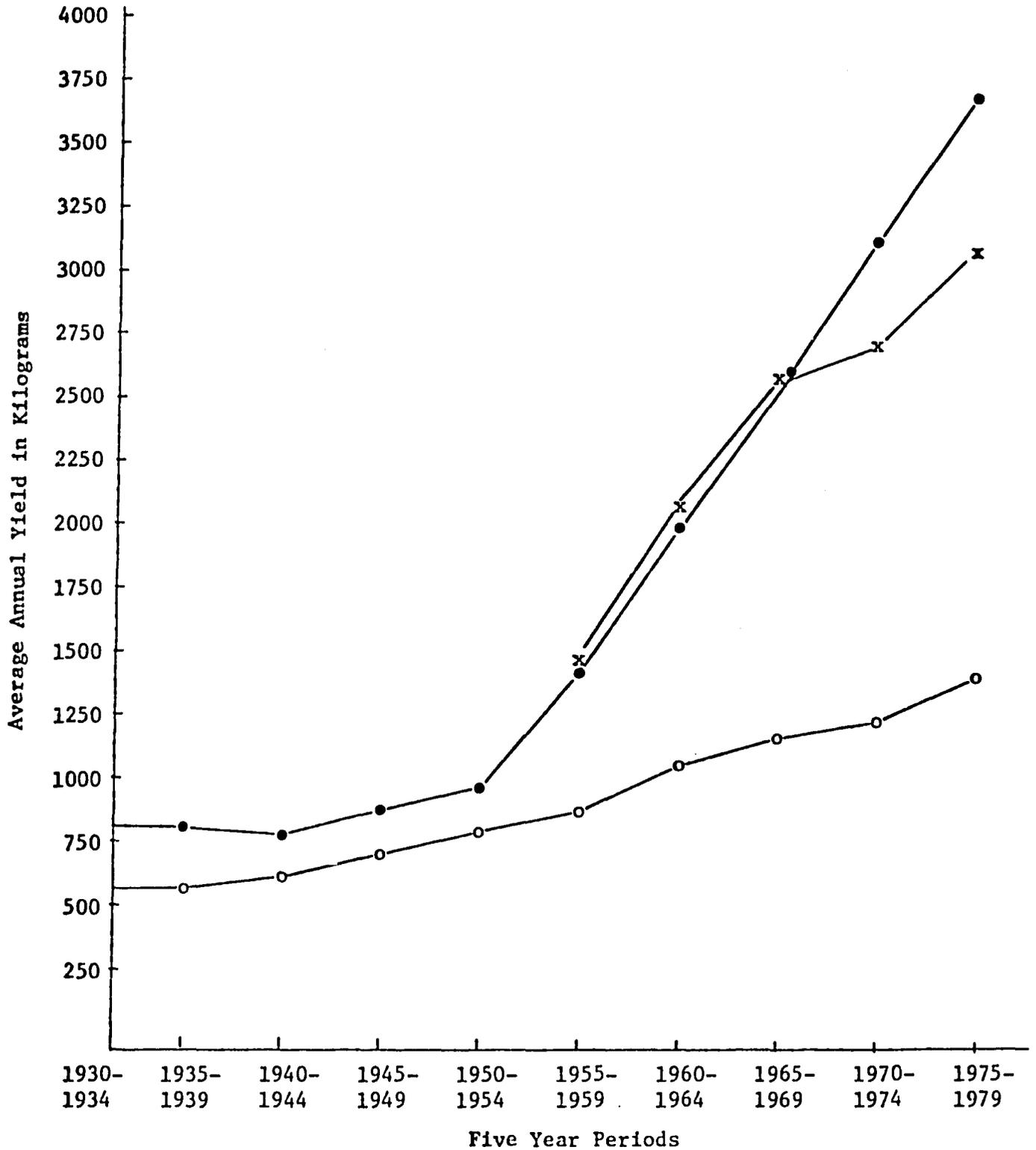
x - Sorghum (Statistics on sorghum were not collected until 1958)

o - Corn

● - Wheat

- Figure 2 -

AVERAGE YIELDS PER HECTARE OF CORN, WHEAT AND SORGHUM IN MEXICO 1930-1979
(Adapted from Econotecnica Agricola, Vol. V., No. 9, Sept. 1981)



x - Sorghum (Statistics on sorghum were not collected until 1958)

o - Corn

● - Wheat

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